SANMOTION

2-PHASE STEPPING SYSTEMS

F2

Ver.6

SANYO DENKI

SANMOTION F2

2-PHASE STEPPING SYSTEMS

- AC Input Set Models
- AC Input Drivers
- DC Input Set Models
- DC Input Drivers
- Stepping Motors — Stepping Motors, IP65 Splash and Dust Proof Stepping Motors, Stepping Motors for Vacuum Environments, Synchronous Motors
- Stepping Motors with Integrated Drivers

Contents

Application Examples ····· p. 4
Lineup ····· p. 5
Lineup Details ····· p. 6

Set Models

Features ····· p. 10
AC Input Set Models ····· p. 12
- System Configuration Diagram ····p. 12
- Set Model Numbering Convention ·p. 13
- Set Model Configuration ····· p. 14
- Bipolar Models Specifications ····· p. 16
- Stepping Motor: Dimensions ····· p. 20
- Stepping Motor: General Specifications ·· p. 21
- Driver Dimensions ····· p. 22
- Driver Specifications ····· p. 22
- Driver Controls and Connectors ···· p. 23
- Connections and Signals ····· p. 25

DC Input Set Models ····· p. 30
- System Configuration Diagram ····p. 30
- Set Model Numbering Convention ·p. 31
- Set Model Configuration ····· p. 32
- Unipolar Models Specifications ···· p. 33
- Bipolar Models Specifications ····· p. 36
- Stepping Motor: Dimensions ····· p. 41
- Stepping Motor: General Specifications ·· p. 43
- Driver Dimensions ····· p. 44
- Driver Specifications ····· p. 45
- Driver Controls and Connectors ···· p. 46
- Connections and Signals ····· p. 47

Stepping Motors

- Lineup ····· p. 50
- Stepping Motors ····· p. 54
- IP65 Splash and Dust Proof Stepping Motors ·· p. 89
- Stepping Motors for Vacuum Environments ·· p. 93
- Synchronous Motors ····· p. 93

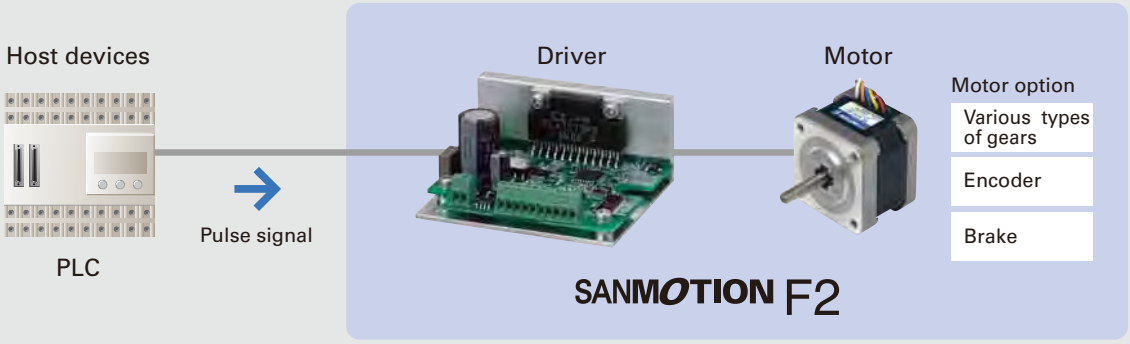
Stepping Motors with Integrated Drivers

- Stepping Motors with Integrated Drivers ·· p. 94

Safety Considerations ····· p. 102

SANMOTION F2
2-PHASE STEPPING SYSTEMS

The SANMOTION F2 is a 2-phase stepping system that provides precise positioning with easy control. The typical basic step angle is 1.8˚ , and accurate control is provided by pulse signals.



- **What is a stepping motor?**
  A stepping motor is a motor that rotates at a fixed angle for each pulse. The rotation speed is proportional to the speed of the command pulse (frequency). Also, the rotation angle can be controlled according to the number of command pulses. Stepping motors are able to make stable stops without vibrating, as they have holding power when the motor is stopped.

- **Bipolar and unipolar drive**
  The bipolar drive allows current to flow across both directions of the winding. The drive circuit is more complex, but it offers high torque.
  The unipolar drive allows current to flow across a single direction of the winding. The drive circuit is simpler than that of the bipolar drive.

Application Examples

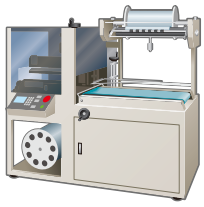
The SANMOTION F2 can be used in a wide variety of applications, including fixed-speed drive synchronized to a command pulse, accurate positioning, and stable stopping.

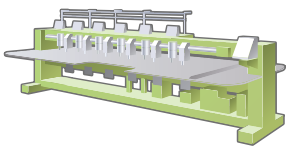
- Semiconductor devices, analytical and testing devices used in medical and environmental fields, ATMs, monitoring cameras and spotlights, packaging machines, embroidering machines, automatic ticket gates and more


ATMs


Blood analyzers


Wafer cleaners


Food packaging machines


Embroidering machines

All model numbers in this catalog are compliant with the tolerances for specified toxic substances (cadmium, lead, mercury, hexavalent chromium, PBB, and PBDE) found in supplement II of the EU RoHS directive (2011/65/EU), as of the October 2012 production lot. SANMOTION F2 drivers also feature standard specifications that are compliant with CE (European Norm) and UL standards. The AC input driver complies with the KC mark standards.

AC input driver only

We also provide quick delivery service for products required earlier than the usual delivery time. Contact the point of sale for information on the applicable model numbers and delivery times.

Lineup

Set Models ▶p. 9–

AC input

Bipolar

The AC power supply input driver comes as a set model with the motor.
A wide range of input voltages can be handled, from 100 to 240 VAC*. The motor winding is bipolar.
*The 42 mm sq. (1.65 inch sq.) motor model only supports 100 to 120 VAC.

Motor size:
42 mm sq. (1.65 inch sq.)/60 mm sq. (2.36 inch sq.)/86 mm sq. (3.39 inch sq.)

DC input

Unipolar

These set models consist of a DC-powered driver and motor.
The input voltage range is from 24 to 36 VDC, and the motor winding is unipolar.

Motor size:
28 mm sq. (1.10 inch sq.)/42 mm sq. (1.65 inch sq.)/56 mm sq. (2.20 inch sq.)

Bipolar

These set models consist of a DC-powered driver and motor.
The input voltage range is from 24 to 36 VDC, and the motor winding is bipolar.

Motor size:
28 mm sq.(1.10 inch sq.)/42 mm sq. (1.65 inch sq.)/50 mm sq (1.97 inch sq.)/
56 mm sq. (2.20 inch sq.)/60 mm sq. (2.36 inch sq.)

Stepping Motors ▶p. 49–

Stepping Motors ▶p. 54–

High-torque stepping motors. Select from among a broad lineup of products from an ultra-compact 14 mm sq. (0.55 inch sq.) motor size, to a thin 11.4 mm (0.45 inch) motor — the shortest motor length.
Consult with us regarding customization. ▶p. 52
A separate driver is required.

Motor size:
14 mm sq. (0.55 inch sq.)/28 mm sq. (1.10 inch sq.)/
35 mm sq. (1.38 inch sq.)/42 mm sq. (1.65 inch sq.)/
50 mm sq. (1.97 inch sq.)/56 mm sq. (2.20 inch sq.)/
60 mm sq. (2.36 inch sq.)/86 mm sq. (3.39 inch sq.,
CE and UL models are available.)/ϕ106 mm (ϕ4.17 inch)

IP65 Splash and Dust Proof Stepping Motors Waterproof, dustproof ▶p. 89–

These IP65 rated motors* have superior water and dust resistance, and can be safely utilized in harsh or wet environments such as in food processing machines.
The input voltage range of the motors is up to 250 VAC.
*Except for the shaft and the cable end.
A separate driver is required.

Motor size:
56 mm sq. (2.20 inch sq.)/
86 mm sq. (3.39 inch sq.)

Stepping Motors for Vacuum Environments Customized Products ▶p. 93

We can customize motors for use in low to ultra-high vacuum environments to suit your system requirements.
A separate driver is required.

Synchronous Motors Customized Products ▶p. 93

Synchronous motors rotate at a constant speed in proportion to the AC power frequency. They operate on the commercial (AC) power supply.

Stepping Motors with Integrated Drivers ▶p. 94–

These motors include integrated drivers. This reduces mounting space requirements and wiring complexity. Three separate control modes: pulse train control, general purpose I/O (parallel interface), and RS-485 compliant serial communications can be selected.

Motor size:
42 mm sq. (1.65 inch sq.)/60 mm sq. (2.36 inch sq.)

Lineup Details

Set Models ▶p. 9–

Series		AC input set models 	DC input set models Unipolar 	DC input set models Bipolar 
Input source		100 to 240 VAC*	24 to 36 VDC	24 to 36 VDC
Number of divisions		1-256 (16 levels)	1, 2, 4, 8, 16	1, 2, 4, 8, 16
Step-angle	Motors with 1.8° basic step angle	1.8° to 0.00703125°/pulse	1.8° to 0.1125°/pulse	1.8° to 0.1125°/pulse
	Motors with 0.9° basic step angle	—	0.9° to 0.05625°/pulse	0.9° to 0.05625°/pulse
Corresponding motor sizes		42 mm sq. (1.65 in sq.)*/ 60 mm sq. (2.36 in sq.)/ 86 mm sq. (3.39 in sq.)	28 mm sq. (1.10 in sq.)/ 42 mm sq. (1.65 in sq.)/ 56 mm sq. (2.20 in sq.)	28 mm sq. (1.10 in sq.)/ 42 mm sq. (1.65 in sq.)/ 50 mm sq. (1.97 in sq.)/ 56 mm sq. (2.20 in sq.)/ 60 mm sq. (2.36 in sq.)
Control method		Pulse input, Open loop (Closed loop is optional)	Pulse input, Open loop	Pulse input, Open loop
Set configuration items		Driver, Motor, Connector, I/O cable	Driver, Motor, Cable with connector (Supplied only with connector-type motors)	Driver, Motor, Cable with connector (Supplied only with connector-type motors)
Page	System Configuration Diagram	p. 12	p. 30	p. 30
	Set Model Configuration	p. 14	p. 32	p. 32
	Specifications/ Characteristics Diagram	pp. 16 to 19	pp. 33 to 35	pp. 36 to 40
	Dimensions	pp. 20, 22	pp. 41 to 42, 44	pp. 41 to 42, 44
	Motor Specifications	p. 21	p. 43	p. 43
	Driver Specifications/ Safety Standards	p. 22	p. 45	p. 45

*The 42 mm sq. (1.65 inch sq.) motor model (AC input set model) only supports 100 to 120 VAC input.

Stepping Motors ▶p. 49–

Stepping Motors ▶p. 54–

Basic step angle	Motor size	Holding torque N·m (oz·in)	Model number	Page	
				Specifications/ Characteristics diagram	Dimensions
0.9°	42 mm sq. (1.65 in sq.)	0.2 to 0.48 (28.3 to 68.0)	SH142 □ - □□□ 1	pp. 58 to 59	pp. 58 to 59
0.9°	60 mm sq. (2.36 in sq.)	0.57 to 2.15 (80.7 to 304)	SH160 □ - □□□ 0	pp. 72 to 73	pp. 72 to 73
1.8°	14 mm sq. (0.55 in sq.) Ultra-compact	0.0065 (0.92)	SH2141-55 □ 1	p. 54	p. 54
1.8°	28 mm sq. (1.10 in sq.)	0.055 to 0.145 (7.79 to 20.5)	SH228 □ -5 □□ 1	pp. 55 to 56	pp. 55 to 56
1.8°	35 mm sq. (1.38 in sq.)	0.12 to 0.23 (17.0 to 32.6)	SH35 □□ -12U □ 0	p. 57	p. 57
1.8°	42 mm sq. (1.65 in sq.) Slim form	0.083 to 0.186 (11.8 to 26.3)	SS242 □ -50 □ 1	p. 60	p. 60
1.8°	42 mm sq. (1.65 in sq.)	0.2 to 0.51 (28.3 to 72.2)	103H52 □□ - □□□ 0	pp. 61 to 63	pp. 61 to 63
1.8°	50 mm sq. (1.97 in sq.)	0.28 to 0.53 (39.7 to 75.1)	103H670 □ - □□□ 0	pp. 64 to 66	pp. 65 to 66
1.8°	50 mm sq. (1.97 in sq.) Slim form	0.1 to 0.215 (14.2 to 30.4)	SS250 □ -80 □ 0	p. 67	p. 67
1.8°	56 mm sq. (2.20 in sq.)	0.39 to 2.0 (55.2 to 283)	103H712 □ - □□□ 0	pp. 68 to 71	pp. 69, 71
1.8°	60 mm sq. (2.36 in sq.)	0.78 to 2.7 (110 to 382)	103H782 □ - □□□ 0	pp. 74 to 77	pp. 75, 77
1.8°	86 mm sq. (3.39 in sq., CE and UL models are available.)	2.5 to 9 (358 to 1270)	SH286 □ - □□□ 1 SM286 □ - □□□□	pp. 78 to 81	pp. 79, 82
1.8°	ϕ106 mm (ϕ4.17 in)	10.8 to 19 (1530 to 2690)	103H8922 □ - □□□ 1	p. 83	p. 83
1.8°	56 mm sq. (2.20 in sq., CE Model)	0.39 to 1.27 (55.2 to 179.8)	103H712 □ -6 □□ 0	p. 84	p. 84
1.8°	ϕ86 mm (ϕ3.39 in, CE Model)	2.74 to 7.44 (388 to 1053.6)	103H822 □ -6 □□ 0	p. 85	p. 85
1.8°	ϕ106 mm (ϕ4.17 in, CE Model)	13.2 to 19 (1869.2 to 2690.5)	103H8922 □ -63 □ 1	p. 86	p. 86

・Contact us for available encoders, gears and motors with brakes.

IP65 Splash and Dust Proof Stepping Motors Waterproof, dustproof ▶p. 89–

Basic step angle	Motor size	Holding torque N·m (oz·in)	Safety standards	Model number	Page	
					Specifications/ Characteristics diagram	Dimensions
1.8°	56 mm sq. (2.20 in sq.)	1 to 1.7 (141.6 to 240.7)	CE/UL Model	SP256 □ -5 □ 60	p. 90	p. 92
1.8°	86 mm sq. (3.39 in sq.)	6.4 to 9 (906.3 to 1274.5)	CE/UL Model	SP286 □ -5 □ 60	p. 91	p. 92

Stepping Motors for Vacuum Environments Customized Products ▶p. 93

We can customize motors for use in low to ultra-high vacuum environments to suit your system requirements.
The motors can handle a wide range of vacuum conditions, including low vacuum, high vacuum, and ultra-high vacuum.

Synchronous Motors Customized Products ▶p. 93

Synchronous motors rotate at a constant speed in proportion to the AC power frequency. The motor can be directly driven using the AC power supply, so a driver is unnecessary.

Stepping Motors with Integrated Drivers ▶p. 94–

Motor size	Input source	Interfaces	Model number	Page	
				Specifications/ Characteristics diagram	Dimensions
42 mm sq. (1.65 in sq.)	24 VDC	・Pulse input ・General-purpose I/O (Parallel) ・Serial communications (compliant with RS-485)	DB21M142S-01	p. 95	p. 101
60 mm sq. (1.65 in sq.)			DB22M162S-01	p. 95	p. 101

Set Models

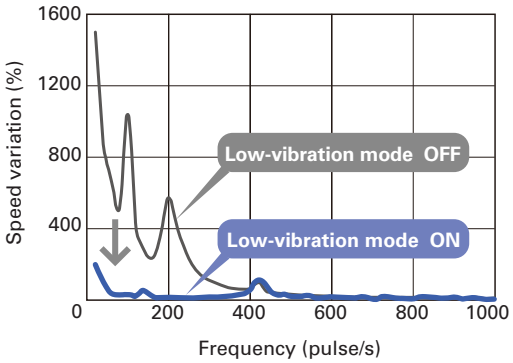
AC Input Set Models ▶p. 12

DC Input Set Models ▶p. 30

Features

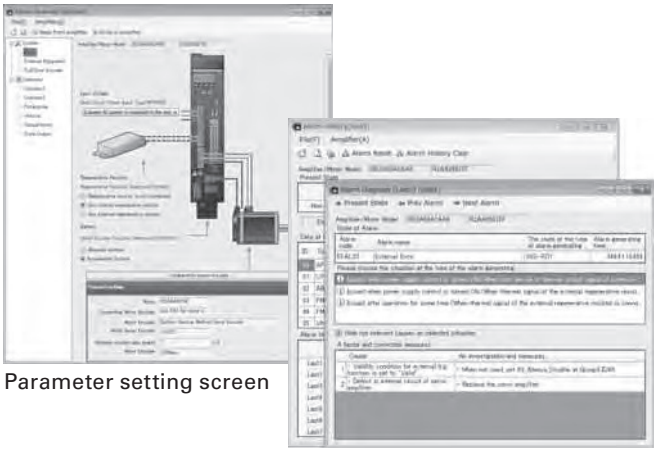
Low vibration AC DC

This driver features approximately 10% less vibration compared with our conventional product (when used with an AC input driver).
Also, a low-vibration mode function provides smooth driving, even with one-division (full-step) and two-division (half-step) coarse resolution settings. This allows vibrations to be suppressed without control system restrictions.



Settings possible with setup software AC

Setup software can be used with a personal computer to adjust control parameters, or to analyze alarms and operation status.



Parameter setting screen

Diagnostic screen

Micro-step drive AC DC

The basic step angle of 1.8˚ can be set to a resolution of up to 256 divisions (for AC input) or 16 divisions (for DC input). This allows for smooth operations with minimal vibrations.

Handles a wide range of voltages AC

A wide range of input voltages can be handled, from 100 to 240 VAC*. This makes it possible to use the device in many different countries and regions.
Also, the input voltage is automatically detected and the optimal motor characteristics are used for control.
*The 42 mm sq. (1.65 inch sq.) motor model only supports 100 to 120 VAC.

Compact size AC

This driver features a 24% reduction in volume compared with our conventional product. This makes it easier to use in places where the setup space is limited.

Multiple options AC

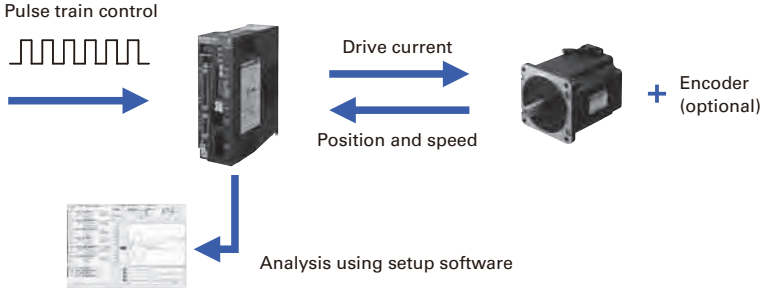
A 4000 P/R high-resolution encoder, and a motor with electromagnetic brake are available as options. The switch timing for motors with an electromagnetic brake is controlled automatically. An external power supply for the brake is unnecessary.

Analysis function and device startup support (option) AC

Using an optional encoder with the motor makes it possible to monitor information such as the current position and speed. It simplifies determining causes of vibration and step-out.

Analysis mode

This mode is suited for device startup and alarm analysis.



How To Read the Specifications

Unipolar

DC input driver (Model No.: US1D200P10) + Motor

RoHS

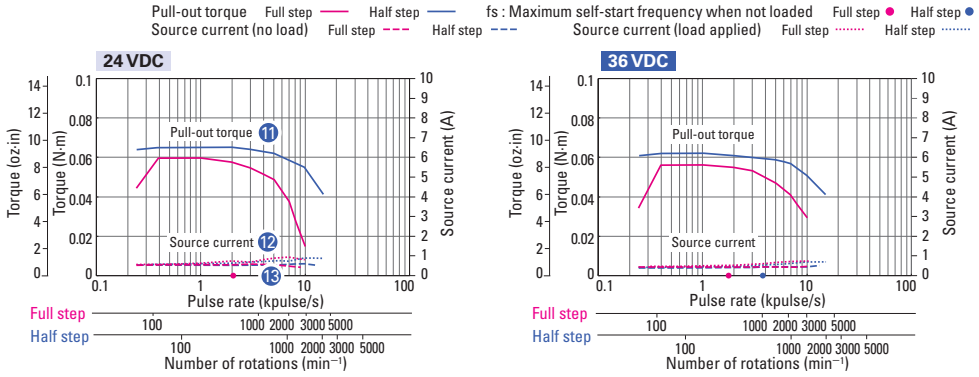
② Size	Motor size		28 mm sq. (1.10 in sq.)/Basic step angle 1.8°		42 mm sq. (1.65 in sq.)/Basic step angle 1.8°	
	Motor length		32 mm (1.26 in)	51.5 mm (2.03 in)	33 mm (1.30 in)	39 mm (1.89 in)
③ Single shaft	Set model number		DU14S281S	DU14S285S	DU15H521S	DU15H522S
	Configuration item: motor number		SH2281-5271	SH2285-5271	103H5205-0440	103H5208-0440
Dual shaft	Set model number		DU14S281D	DU14S285D	DU15H521D	DU15H522D
	Configuration item: motor number		SH2281-5231	SH2285-5231	103H5205-0410	103H5208-0410
④ Holding torque		N·m (oz·in)	0.055 (7.79)	0.115 (16.28)	0.2 (28.32)	0.3 (42.48)
⑤ Rotor inertia		X 10^{-4}kg·m² (oz·in²)	0.01 (0.05)	0.022 (0.12)	0.036 (0.20)	0.056 (0.31)
⑥ Rated current		A/phase	1	1	1.2	1.2
⑦ Motor mass *1		kg (lbs)	0.11 (0.24)	0.2 (0.44)	0.23 (0.51)	0.29 (0.64)
⑧ Allowable thrust load		N (lbs)	3 (0.67)	3 (0.67)	10 (2.25)	10 (2.25)
⑨ Allowable radial load *2		N (lbs)	42 (9.44)	49 (11.02)	26 (5.85)	25 (5.62)

*1 Driver mass ▶p. 45 *2 The load point is at the tip of the output shaft.

⑩ Characteristics diagram

With rubber coupling

DU14S281S
DU14S281D



① Model number of the driver included in the set.

② Size and length of the stepping motor included in the set. When driving in full step mode, the basic step angle is the rotation angle with each pulse. When driving in half step mode, the motor rotates at half of the basic step angle.

③ The set model number and the model number of the stepping motor included in the set. The model number for the stepping motor shaft varies for single shaft and dual shaft.

④ This is the maximum torque that occurs when using 2-phase excitation at rated current, causing the shaft to rotate from the outside.

⑤ This is the moment of inertia of the rotor.

⑥ This is the rated current that flows to the motor winding.

⑦ This is the mass of the stepping motor.

⑧ This is the allowable load when applying a load to the shaft in the axial direction. Do not exceed this value when using this product.

⑨ This is the allowable load when applying a load to the shaft perpendicular to the axial direction. Do not exceed this value when using this product.

⑩ This graph shows the relationship between the pulse rate (frequency), speed, and torque. The driver source current is shown in addition to the torque. Full step is shown in red, and half step is shown in blue.

⑪ The pull-out torque is the maximum torque in which synchronized operation is possible for a certain command pulse. If a torque that exceeds this value is applied to the stepping motor, it will be unable to synchronize with the command pulse. Thus, when selecting a motor, you should allow for a torque margin of 1.4 to 2 times, in order to avoid step-out.

⑫ This graph shows the current value for the power supply that supplies the driver.

- The red and blue dashed lines show the source current value when there is no load (motor by itself).
- The red and blue dotted lines show the source current value when the maximum torque is applied to the stepping motor (during load).

The required power supply capacity (W) is calculated from this graph.

⑬ The red- and blue-colored dots in the lower part of the graph show the upper limit for the self-start frequency (maximum self-start frequency: fs) of the stepping motor by itself (no load). Full step is shown in red, and half step is shown in blue. The stepping motor will not operate normally if it is started using frequencies that exceed these values. For this reason, it is necessary to start the stepping motor using frequencies that are lower than these values. The maximum self-start frequency (f_L) which includes the load can be determined using the relational expression below.

$$f_L = \frac{fs}{\sqrt{1 + \frac{J_L}{J_M}}}$$

J_M: Rotor inertia
J_L: Load inertia
fs : Maximum self-start frequency when not loaded

AC Input Set Models

Bipolar

Set Model Configuration ▶ p. 14
Specifications/Characteristics Diagram ▶ pp. 16 to 19
Motor Dimensions ▶ p. 20 Motor Specifications ▶ p. 21
Driver Dimensions ▶ p. 22 Driver Specifications ▶ p. 22

Set configuration items RoHS

Driver

Model number: F2BAW200M100 Motor rated current: 2 A
Model number: F2BAW400M100 Motor rated current: 4 A

- The operation manual can be downloaded from our website.
- Drivers are available for separate purchase.

Connector

Model number for power supply (CN1): FC5P0000A
Model number for motor connection (CN2): FC5M0000A

Cable

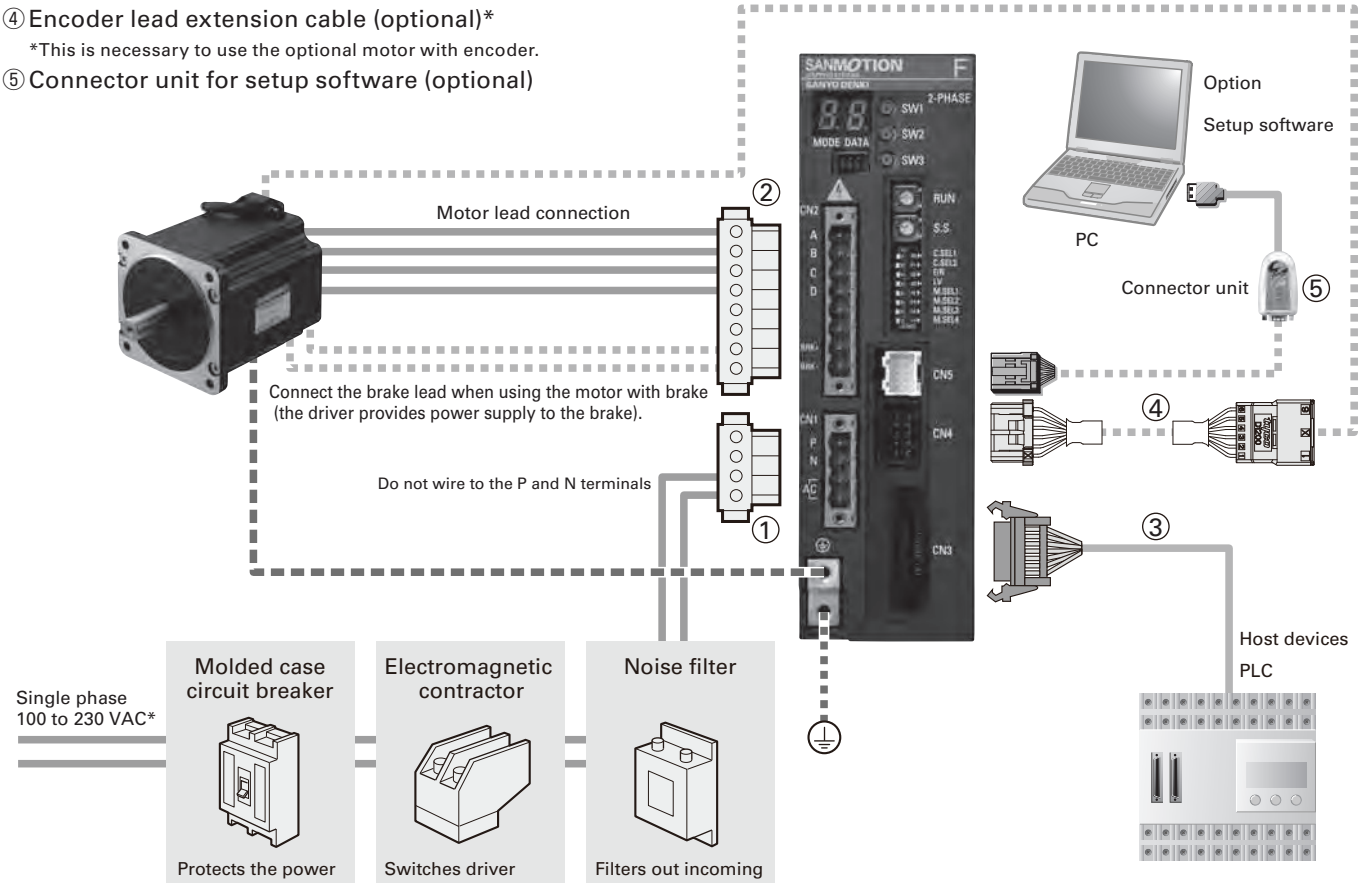
Model number for I/O (for connecting host devices) (CN3): FC5S0010A
Cable length 1 m (39.4 inch)

Motor

Motor size: 42 mm sq. (1.65 inch sq.), 60 mm sq. (2.36 inch sq.), 86 mm sq. (3.39 inch sq.)

System Configuration Diagram

① Power supply connector CN1 (set configuration items; model number: FC5P0000A)
② Motor connector CN2 (set configuration items; model number: FC5M0000A)
③ I/O cable 1 m (39.4 inch) (set configuration items; model number: FC5S0010A)
④ Encoder lead extension cable (optional)*
*This is necessary to use the optional motor with encoder.
⑤ Connector unit for setup software (optional)



*The 42 mm sq. (1.65 inch sq.) motor model only supports 100 to 120 VAC.

Set Model Numbering Convention

Not every combination of the following codes or characters is available. Check the set model component details on the following page for the model number combinations, or contact us.

Example: This is a set model number for the AC input driver (model number: F2BAW200M100) and motor (model number: SH2861-4041). The motor specifications are motor size: 86 mm sq. (3.39 inch sq.), motor length: 66 mm (2.6 inch), single shaft.

Stepping motor shaft specification
S: Single shaft
D: Dual shaft

Stepping motor total length

Code	Stepping motor size					
	42 mm sq. (1.65 inch sq.)		**60 mm sq. (2.36 inch sq.)**		**86 mm sq. (3.39 inch sq.)**	
	Type code	Motor length: mm (in)	Type code	Motor length: mm (in)	Type code	Motor length: mm (in)
1			7821	45.9 (1.81)	2861	66 (2.6)
2	5208	39 (1.54)	7822	54.9 (2.16)	2862	96.5 (3.8)
3			7823	86.9 (3.42)	2863	127 (5)

Stepping motor size	Basic step angle
42: 42 mm sq. (1.65 inch sq.)	1.8°
60: 60 mm sq. (2.36 inch sq.)	1.8°
86: 86 mm sq. (3.39 inch sq.)	1.8°

Stepping motor series name
F: F series
S: SH series

Rated current specification
2: 2 A/phase
4: 4 A/phase

Model

Driver specification
B: 2-phase bipolar winding

Driver power supply specifications
W: 100 to 240 VAC wide-range input

Set Model Configuration

This set includes the driver, motor, power supply connector, motor connector, and an I/O cable.

Bipolar

Motor size	Single shaft			Dual shaft			Basic step angle	Rated current (A/phase)	Page	
	Set model number	Set configuration items (Connectors and cables are listed below the table)		Set model number	Set configuration items (Connectors and cables are listed below the table)				Specifi-cations	Dimen-sions
		Motor	Driver		Motor	Driver				
42 mm sq.	**WB12F422S**	103F5208-4041 (100 VAC only)	F2BAW200M100	**WB12F422D**	103F5208-4011 (100 VAC only)	F2BAW200M100	1.8°	2	p. 16	p. 20
60 mm sq.	**WB12F601S**	103F7821-4041	F2BAW200M100	**WB12F601D**	103F7821-4011	F2BAW200M100	1.8°	2	p. 16	p. 20
	WB14F601S	103F7821-4141	F2BAW400M100	**WB14F601D**	103F7821-4111	F2BAW400M100	1.8°	4	p. 16	p. 20
	WB12F602S	103F7822-4041	F2BAW200M100	**WB12F602D**	103F7822-4011	F2BAW200M100	1.8°	2	p. 17	p. 20
	WB14F602S	103F7822-4141	F2BAW400M100	**WB14F602D**	103F7822-4111	F2BAW400M100	1.8°	4	p. 17	p. 20
	WB12F603S	103F7823-4041	F2BAW200M100	**WB12F603D**	103F7823-4011	F2BAW200M100	1.8°	2	p. 17	p. 20
	WB14F603S	103F7823-4141	F2BAW400M100	**WB14F603D**	103F7823-4111	F2BAW400M100	1.8°	4	p. 17	p. 20
86 mm sq.	**WB12S861S**	SH2861-4041	F2BAW200M100	**WB12S861D**	SH2861-4011	F2BAW200M100	1.8°	2	p. 18	p. 20
	WB14S861S	SH2861-4141	F2BAW400M100	**WB14S861D**	SH2861-4111	F2BAW400M100	1.8°	4	p. 18	p. 20
	WB12S862S	SH2862-4041	F2BAW200M100	**WB12S862D**	SH2862-4011	F2BAW200M100	1.8°	2	p. 18	p. 20
	WB14S862S	SH2862-4141	F2BAW400M100	**WB14S862D**	SH2862-4111	F2BAW400M100	1.8°	4	p. 19	p. 20
	WB12S863S	SH2863-4041	F2BAW200M100	**WB12S863D**	SH2863-4011	F2BAW200M100	1.8°	2	p. 19	p. 20
	WB14S863S	SH2863-4141	F2BAW400M100	**WB14S863D**	SH2863-4111	F2BAW400M100	1.8°	4	p. 19	p. 20

- Motors with brakes, encoders, or with both brakes and encoders are available as options. Contact us for details.
  Encoders are for use in closed-loop control, with specs of 4000 P/R and 3 channels.
- 42 mm sq. (1.65 inch sq.) and 60 mm sq. (2.36 inch sq.) motors include lead wires. 86 mm sq. (3.39 inch sq.) motors are a cable type, with lead wires exiting from the terminal. The lead wire and cable length is 500 mm (19.69 inch) or greater.

Power supply connector (CN1)

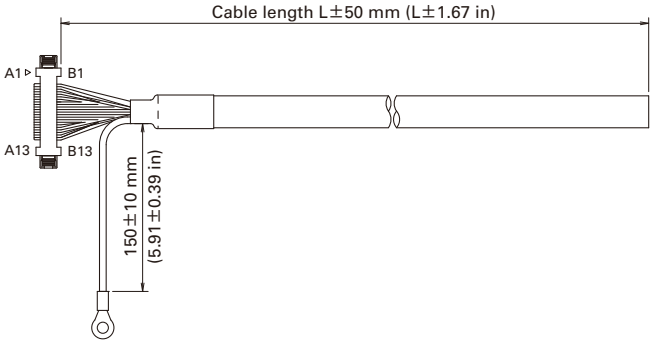
Model number	Manufacturer model number	Manufacturer
FC5P0000A	MSTBT 2,5/4-STF-5,08	PHOENIX CONTACT

Motor connector (CN2)

Model number	Manufacturer model number	Manufacturer
FC5M0000A	MSTBT 2,5/8-STF-5,08	PHOENIX CONTACT

I/O cable (CN3), 1 m (39.4 inch)

Model number
FC5S0010A



Options (sold separately)

Power supply and motor connector set　Model number: FA-002

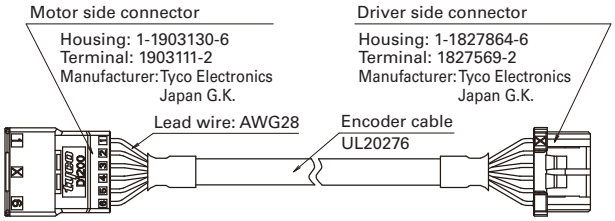
Manufacturer	Name	Manufacturer model number	Quantity
PHOENIX CONTACT	Connector	MSTBT 2,5/4-STF-5,08	1
	Connector	MSTBT 2,5/8-STF-5,08	1

Encoder extension connector set　Model number: FC5E0000A

Manufacturer	Name	Manufacturer model number	Quantity
Tyco Electronics Japan G.K.	Recessed housing	1-1827864-6	1
	Recessed contact	1827570-2	10
	Tab housing	1-1903130-6	1
	Tab contact	1903112-2	10

Encoder extension cable

Model number	Cable length (L)
FC5E0010A	1 m (39.4 in)
FC5E0020A	2 m (78.7 in)
FC5E0030A	3 m (118.1 in)



Connector for I/O signals　Model number: FC5S0000A

Manufacturer	Name	Manufacturer model number	Quantity
KEL CORPORATION	Connector	8822E-026-171D-F	1

I/O cable

Model number	Cable length (L)
FC5S0010A	1 m (39.4 in)
FC5S0020A	2 m (78.7 in)

Dimensions are the same as the diagram shown in "Set Model Configuration" on p. 14.

- Contact us if you need a different cable length than those listed here.
- Contact us if you need a robot cable.
- Special crimping and pressure welding tools are required to assemble the harness. Refer to the manufacturer of the individual connectors for details.
- Refer to pp. 25 to 26 for compatible wires, model number details, and connector pin arrangements.

Connector unit for setup software　Model number: PBFM-U6

Name	Manufacturer model number	Quantity
USB/RS-485 converter	Uport 1130 (manufactured by MOXA)	1
Cable	PBC6T0005A (5 m) (19.7 in)	1

Refer to the included installation manual (CD-ROM) or the manufacturer's website for instructions on installing the Uport 1130 driver or details on its use.

Setup software (free)

Name	SANMOTION MOTOR SETUP SOFTWARE
Compatible operating systems	Windows XP (SP3 or higher)/Vista/7

The software can be downloaded from the Product Information page on our website.　URL: http://www.sanyodenki.com

Bipolar AC input driver + Motor

RoHS

Size	Motor size	42 mm sq. (1.65 in sq.)	60 mm sq. (2.36 in sq.)	
	Motor length	39 mm (1.54 in)	45.9 mm (1.81 in)	45.9 mm (1.81 in)
Single shaft	Set model number	**WB12F422S** (100 VAC only)	**WB12F601S**	**WB14F601S**
	Configuration item: motor number	103F5208-4041	103F7821-4041	103F7821-4141
	Configuration item: driver number	F2BAW200M100	F2BAW200M100	F2BAW400M100
Dual shaft	Set model number	**WB12F422D** (100 VAC only)	**WB12F601D**	**WB14F601D**
	Configuration item: motor number	103F5208-4011	103F7821-4011	103F7821-4111
	Configuration item: driver number	F2BAW200M100	F2BAW200M100	F2BAW400M100
Holding torque	N·m (oz·in)	0.325 (46.02)	0.91 (128.87)	0.91 (128.87)
Rotor inertia	× 10^{-4}kg·m² (oz·in²)	0.056 (0.31)	0.275 (1.50)	0.275 (1.50)
Rated current	A/phase	2	2	4
Motor mass *1	kg (lbs)	0.29 (0.64)	0.6 (1.32)	0.6 (1.32)
Allowable thrust load	N (lbs)	10 (2.25)	20 (4.5)	20 (4.5)
Allowable radial load *2	N (lbs)	48 (10.79)	209 (47.04)	209 (47.04)

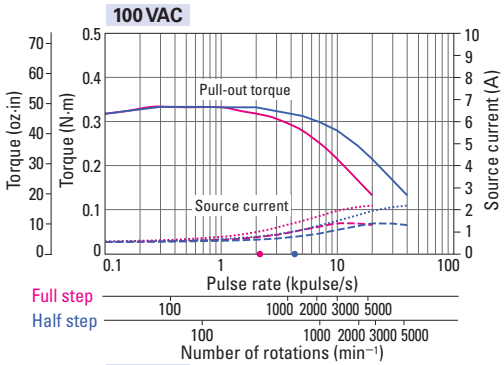
*1 Driver mass ▶p. 22 *2 The load point is at the tip of the output shaft.

Characteristics diagram

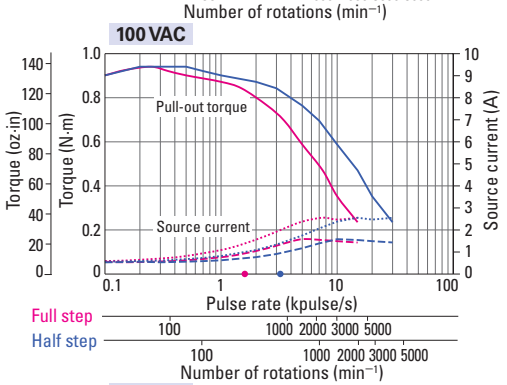
With rubber coupling

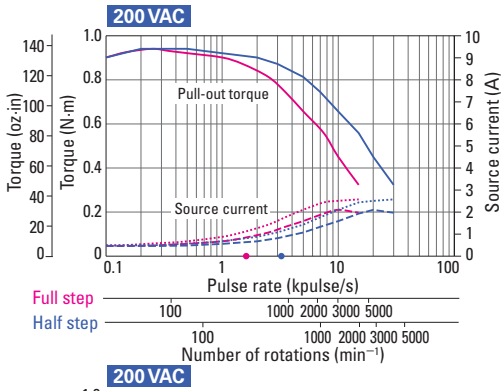
Pull-out torque Full step —— Half step —— fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (no load) Full step - - - Half step - - - Source current (load applied) Full step ····· Half step ·····

WB12F422S
WB12F422D

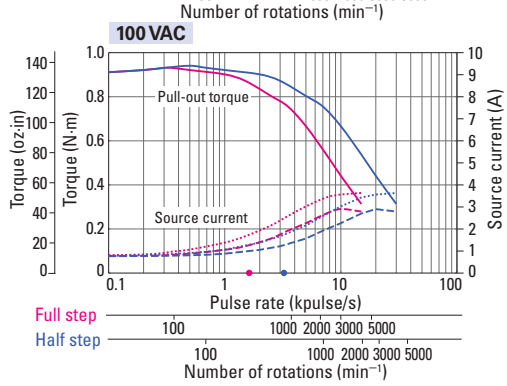


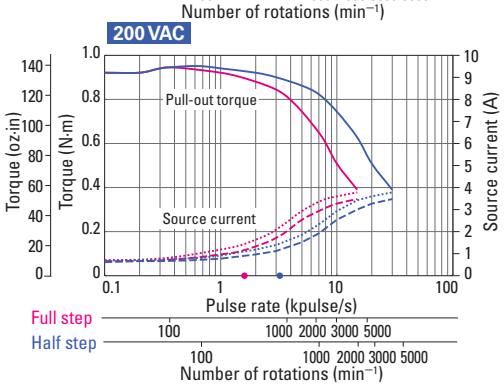
WB12F601S
WB12F601D





WB14F601S
WB14F601D





Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Bipolar AC input driver + Motor

RoHS

Size	Motor size	60 mm sq. (2.36 in sq.)			
	Motor length	54.9 mm (2.16 in)	54.9 mm (2.16 in)	86.9 mm (3.42 in)	86.9 mm (3.42 in)
Single shaft	Set model number	**WB12F602S**	**WB14F602S**	**WB12F603S**	**WB14F603S**
	Configuration item: motor number	103F7822-4041	103F7822-4141	103F7823-4041	103F7823-4141
	Configuration item: driver number	F2BAW200M100	F2BAW400M100	F2BAW200M100	F2BAW400M100
Dual shaft	Set model number	**WB12F602D**	**WB14F602D**	**WB12F603D**	**WB14F603D**
	Configuration item: motor number	103F7822-4011	103F7822-4111	103F7823-4011	103F7823-4111
	Configuration item: driver number	F2BAW200M100	F2BAW400M100	F2BAW200M100	F2BAW400M100
Holding torque	N·m (oz·in)	1.35 (191.18)	1.35 (191.18)	2.35 (332.79)	2.35 (332.79)
Rotor inertia	$\times 10^{-4}$kg·m² (oz·in²)	0.4 (2.19)	0.4 (2.19)	0.84 (4.59)	0.84 (4.59)
Rated current	A/phase	2	4	2	4
Motor mass *1	kg (lbs)	0.77 (1.70)	0.77 (1.70)	1.34 (2.95)	1.34 (2.95)
Allowable thrust load	N (lbs)	20 (4.5)	20 (4.5)	20 (4.5)	20 (4.5)
Allowable radial load *2	N (lbs)	200 (44.96)	200 (44.96)	178 (40.02)	178 (40.02)

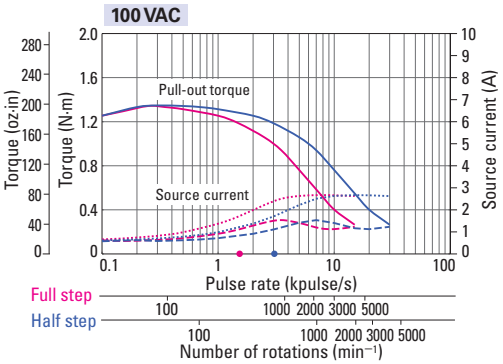
*1 Driver mass ▶p. 22 *2 The load point is at the tip of the output shaft.

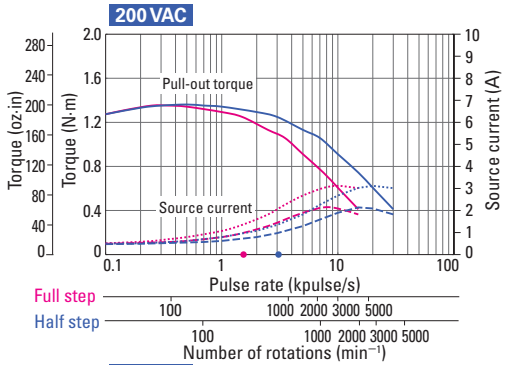
Characteristics diagram

With rubber coupling

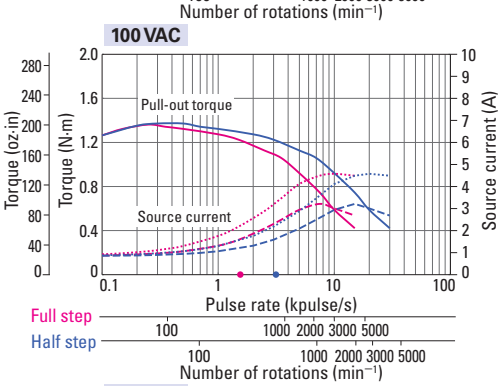
Pull-out torque Full step —— Half step —— fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (no load) Full step - - - Half step - - - Source current (load applied) Full step ····· Half step ·····

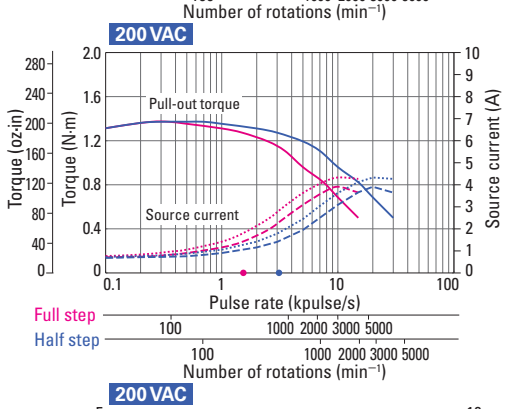
WB12F602S
WB12F602D



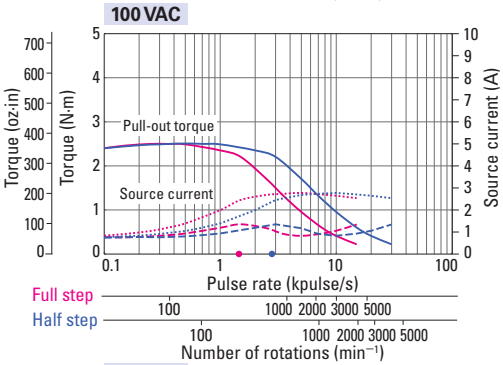


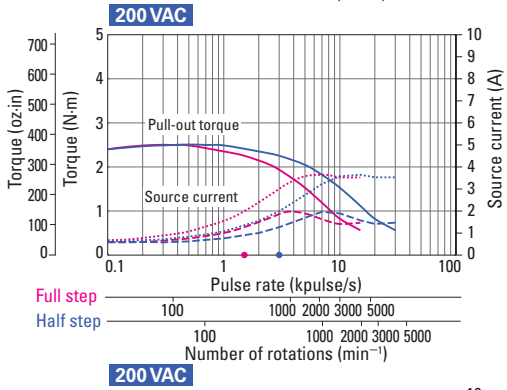
WB14F602S
WB14F602D



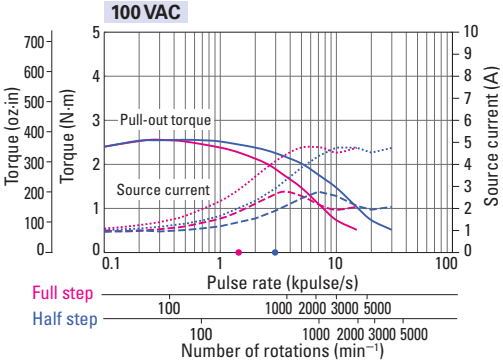


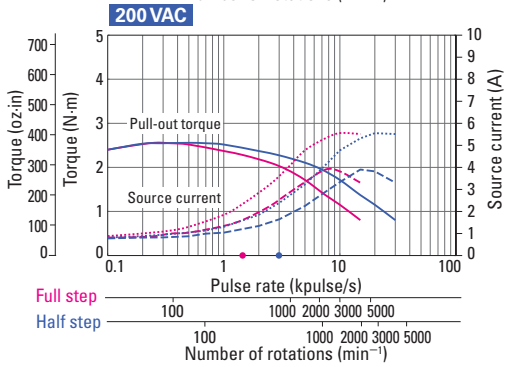
WB12F603S
WB12F603D





WB14F603S
WB14F603D





System Configuration Diagram▶p. 12 Set Model Configuration▶p. 14 Motor Dimensions▶p. 20 Driver Dimensions▶p. 22

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Bipolar AC input driver + Motor

RoHS

Size	Motor size		86 mm sq. (3.39 in sq.)		
	Motor length		66 mm (2.6 in)	66 mm (2.6 in)	96.5 mm (3.8 in)
Single shaft	Set model number		**WB12S861S**	**WB14S861S**	**WB12S862S**
	Configuration item: motor number		SH2861-4041	SH2861-4141	SH2862-4041
	Configuration item: driver number		F2BAW200M100	F2BAW400M100	F2BAW200M100
Dual shaft	Set model number		**WB12S861D**	**WB14S861D**	**WB12S862D**
	Configuration item: motor number		SH2861-4011	SH2861-4111	SH2862-4011
	Configuration item: driver number		F2BAW200M100	F2BAW400M100	F2BAW200M100
Holding torque		N·m (oz·in)	3.3 (495.64)	3.3 (495.64)	6.4 (906.32)
Rotor inertia		× 10^{-4}kg·m² (oz·in²)	1.48 (8.09)	1.48 (8.09)	3.0 (16.4)
Rated current		A/phase	2	4	2
Motor mass *1		kg (lbs)	1.75 (3.85)	1.75 (3.85)	2.9 (6.38)
Allowable thrust load		N (lbs)	60 (13.49)	60 (13.49)	60 (13.49)
Allowable radial load *2		N (lbs)	200 (44.96)	200 (44.96)	200 (44.96)

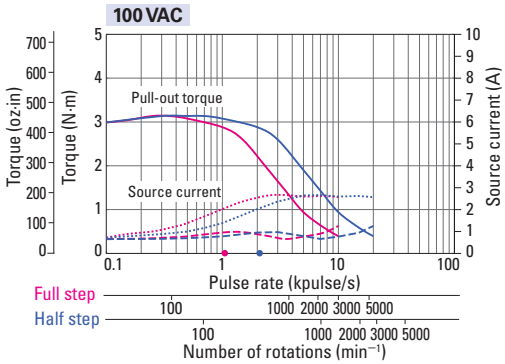
*1 Driver mass ▶p. 22 *2 The load point is at the tip of the output shaft.

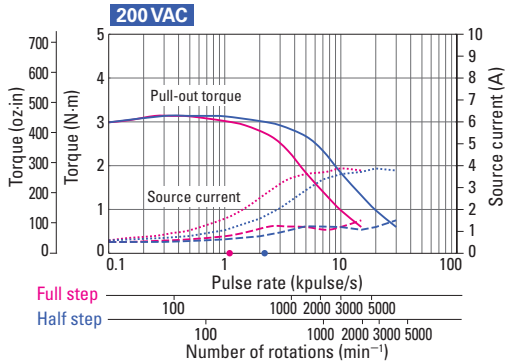
Characteristics diagram

With rubber coupling

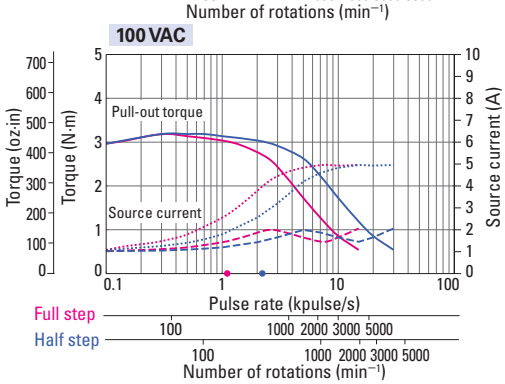
Pull-out torque Full step Half step fs : Maximum self-start frequency when not loaded Full step Half step
Source current (no load) Full step Half step Source current (load applied) Full step Half step

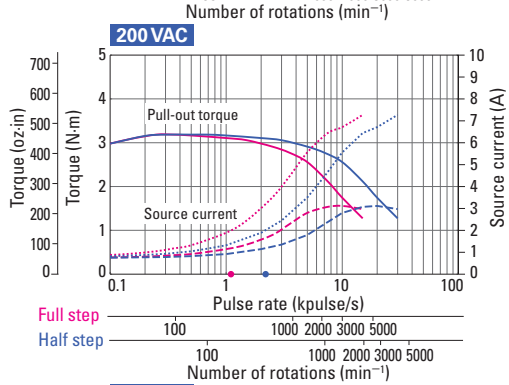
WB12S861S WB12S861D



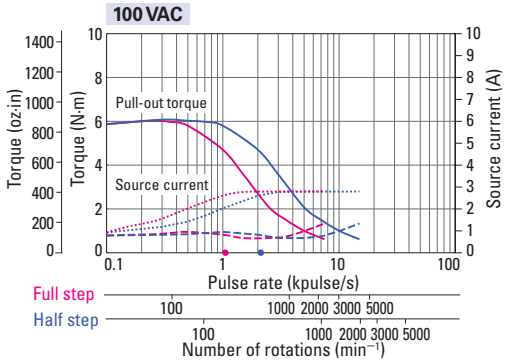


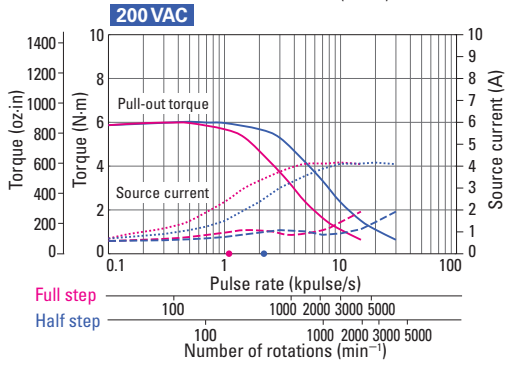
WB14S861S WB14S861D





WB12S862S WB12S862D





System Configuration Diagram▶p. 12 Set Model Configuration▶p. 14 Motor Dimensions▶p. 20 Driver Dimensions▶p. 22

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Bipolar AC input driver + Motor

RoHS

Size	Motor size	86 mm sq. (3.39 in sq.)		
	Motor length	96.5 mm (3.8 in)	127 mm (5 in)	127 mm (5 in)
Single shaft	Set model number	**WB14S862S**	**WB12S863S**	**WB14S863S**
	Configuration item: motor number	SH2862-4141	SH2863-4041	SH2863-4141
	Configuration item: driver number	F2BAW400M100	F2BAW200M100	F2BAW400M100
Dual shaft	Set model number	**WB14S862D**	**WB12S863D**	**WB14S863D**
	Configuration item: motor number	SH2862-4111	SH2863-4011	SH2863-4111
	Configuration item: driver number	F2BAW400M100	F2BAW200M100	F2BAW400M100
Holding torque	N·m (oz·in)	6.4 (906.32)	9 (1274.51)	9 (1274.51)
Rotor inertia	× 10^{-4}kg·m² (oz·in²)	3 (16.4)	4.5 (24.6)	4.5 (24.6)
Rated current	A/phase	4	2	4
Motor mass *1	kg (lbs)	2.9 (6.38)	4 (8.8)	4 (8.8)
Allowable thrust load	N (lbs)	60 (13.49)	60 (13.49)	60 (13.49)
Allowable radial load *2	N (lbs)	200 (44.96)	200 (44.96)	200 (44.96)

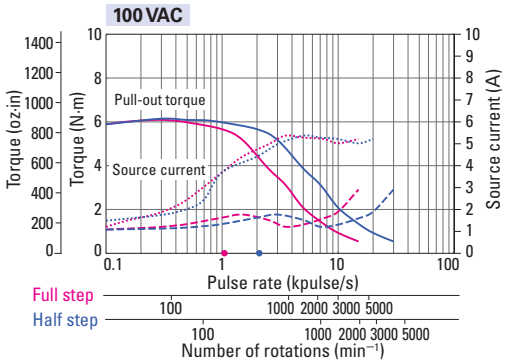
*1 Driver mass ▶p. 22 *2 The load point is at the tip of the output shaft.

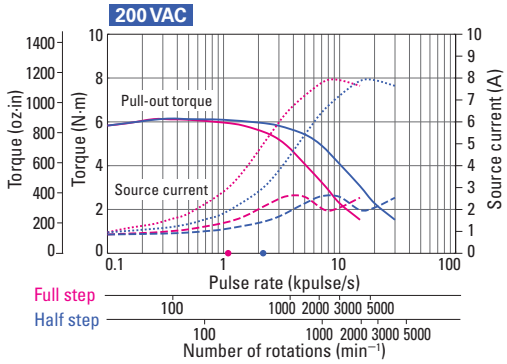
Characteristics diagram

With rubber coupling

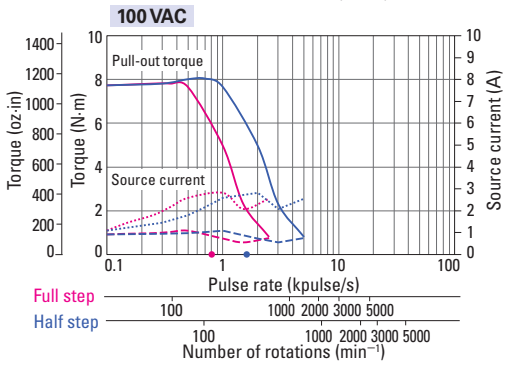
Pull-out torque Full step —— Half step —— fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (no load) Full step - - - Half step - - - Source current (load applied) Full step ····· Half step ·····

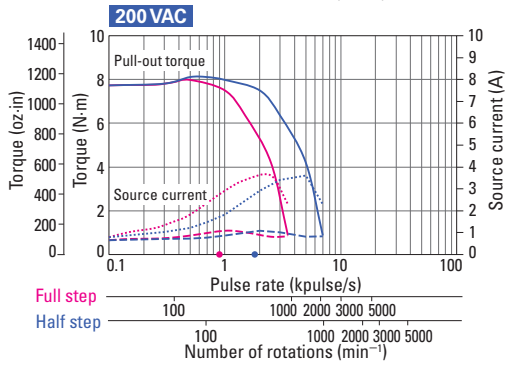
WB14S862S
WB14S862D



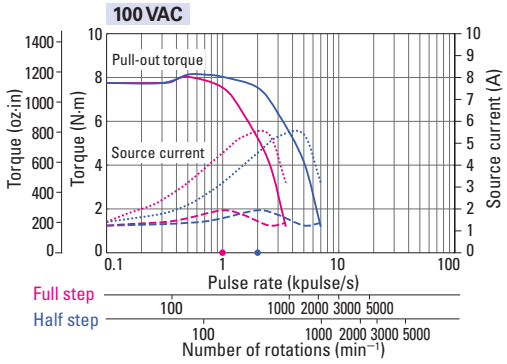


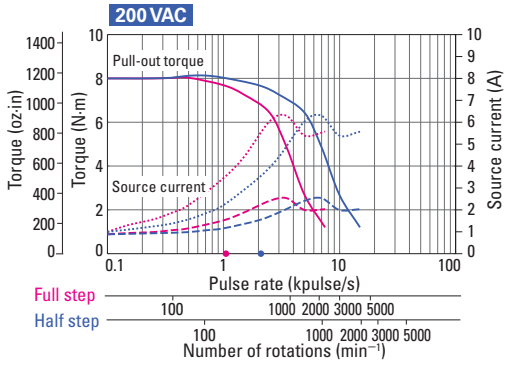
WB12S863S
WB12S863D





WB14S863S
WB14S863D





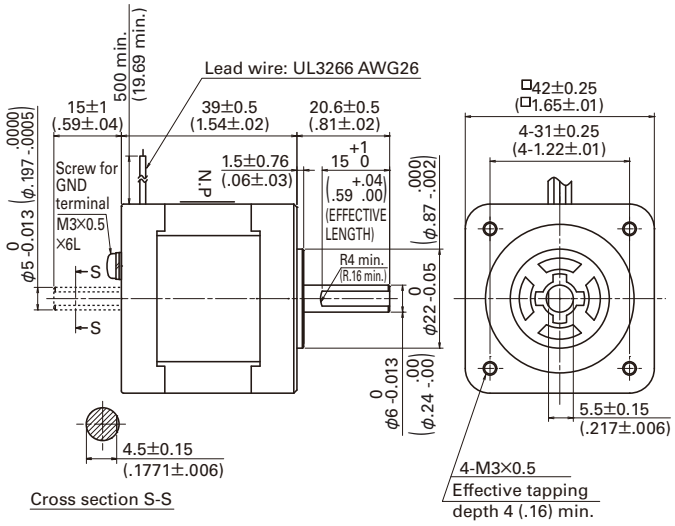
System Configuration Diagram▶p. 12 Set Model Configuration▶p. 14 Motor Dimensions▶p. 20 Driver Dimensions▶p. 22

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Stepping Motor: Dimensions

[Unit: mm (inch)]

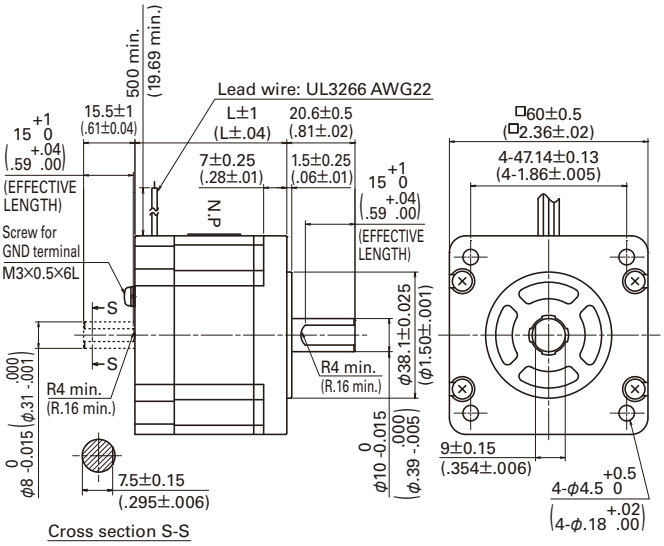
42 mm sq. (1.65 inch sq.)



Bipolar

Set model number		Motor model number	
Single shaft	Dual shaft	Single shaft	Dual shaft
WB12F422S	WB12F422D	103F5208-4041	103F5208-4011

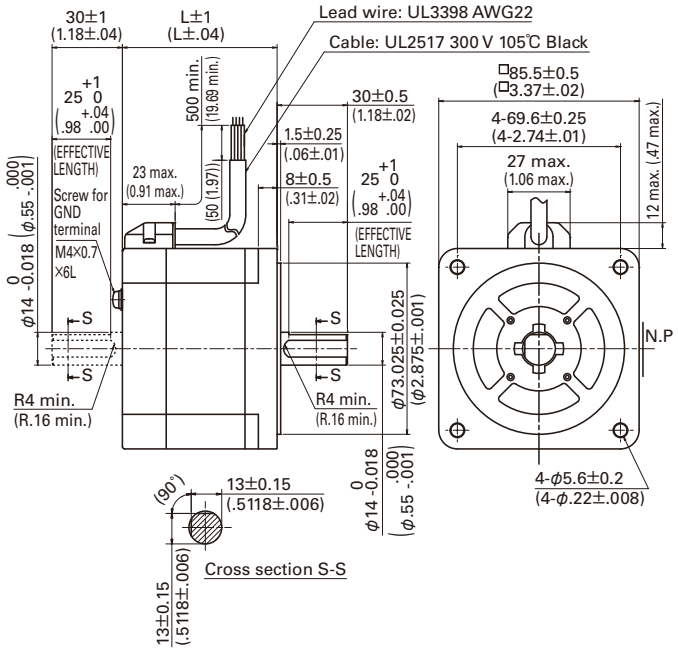
60 mm sq. (2.36 inch sq.)



Bipolar

Set model number		Motor model number		Motor length (L)
Single shaft	Dual shaft	Single shaft	Dual shaft	
WB12F601S	WB12F601D	103F7821-4041	103F7821-4011	45.9 (1.81)
WB14F601S	WB14F601D	103F7821-4141	103F7821-4111	45.9 (1.81)
WB12F602S	WB12F602D	103F7822-4041	103F7822-4011	54.9 (2.16)
WB14F602S	WB14F602D	103F7822-4141	103F7822-4111	54.9 (2.16)
WB12F603S	WB12F603D	103F7823-4041	103F7823-4011	86.9 (3.42)
WB14F603S	WB14F603D	103F7823-4141	103F7823-4111	86.9 (3.42)

86 mm sq. (3.39 inch sq.)



Bipolar

Set model number		Motor model number		Motor length (L)
Single shaft	Dual shaft	Single shaft	Dual shaft	
WB12S861S	WB12S861D	SH2861-4041	SH2861-4011	66 (2.6)
WB14S861S	WB14S861D	SH2861-4141	SH2861-4111	66 (2.6)
WB12S862S	WB12S862D	SH2862-4041	SH2862-4011	96.5 (3.8)
WB14S862S	WB14S862D	SH2862-4141	SH2862-4111	96.5 (3.8)
WB12S863S	WB12S863D	SH2863-4041	SH2863-4011	127 (5)
WB14S863S	WB14S863D	SH2863-4141	SH2863-4111	127 (5)

Stepping Motor: General Specifications

Motor model number	103F5208	103F782 □	SH286 □
Type	–		
Operating ambient temperature	– 10℃ to + 40℃		
Conversation temperature	– 20℃ to + 60℃		
Operating ambient humidity	90% RH: 40℃ max. (no condensation)		
Conversation humidity	90% RH: 40℃ max., 57% RH: 50℃ max., 35% RH: 60℃ max. (no condensation)		
Operation altitude	1000 m (3281 feet) max. above sea level		
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 150 m/s² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.		
Impact resistance	500 m/s² of acceleration for 11 ms with half-sine wave applying three times for X, Y, and Z axes each, 18 times in total.		
Insulation class	Class B (+130℃)		
Withstandable voltage	At normal temperature and humidity, no failure with 1500 VAC @50/60 Hz applied for one minute between motor winding and frame.		
Insulation resistance	At normal temperature and humidity, not less than 100 M Ω between winding and frame by 500 VDC megger.		
Protection grade	IP40		
Winding temperature rise	80 K max. (Based on Sanyo Denki standard)		
Static angle error	± 0.09°	± 0.054°	± 0.09°
Thrust play *1	0.075 mm (0.003 in) (load: 0.35 N (0.08 lbs))	0.075 mm (0.003 in) (load: 10 N (2.25 lbs))	0.075 mm (0.003 in) (load: 10 N (2.25 lbs))
Radial play *2	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))
Shaft runout	0.025 mm (0.001 in)	0.025 mm (0.001 in)	0.025 mm (0.001 in)
Concentricity of mounting pilot relative to shaft	ϕ 0.05 mm (ϕ 0.002 in)	ϕ 0.075 mm (ϕ 0.003 in)	ϕ 0.075 mm (ϕ 0.003 in)
Squareness of mounting surface relative to shaft	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.15 mm (0.006 in)
Direction of motor mounting	Can be freely mounted vertically or horizontally		

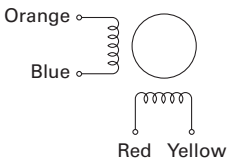
*1 Thrust play: Shaft displacement under axial load.
*2 Radial play: Shaft displacement under radial load applied 1/3rd of the length from the end of the shaft.

Internal Wiring and Rotation Direction

Bipolar winding

Lead wire type

Internal wire connection

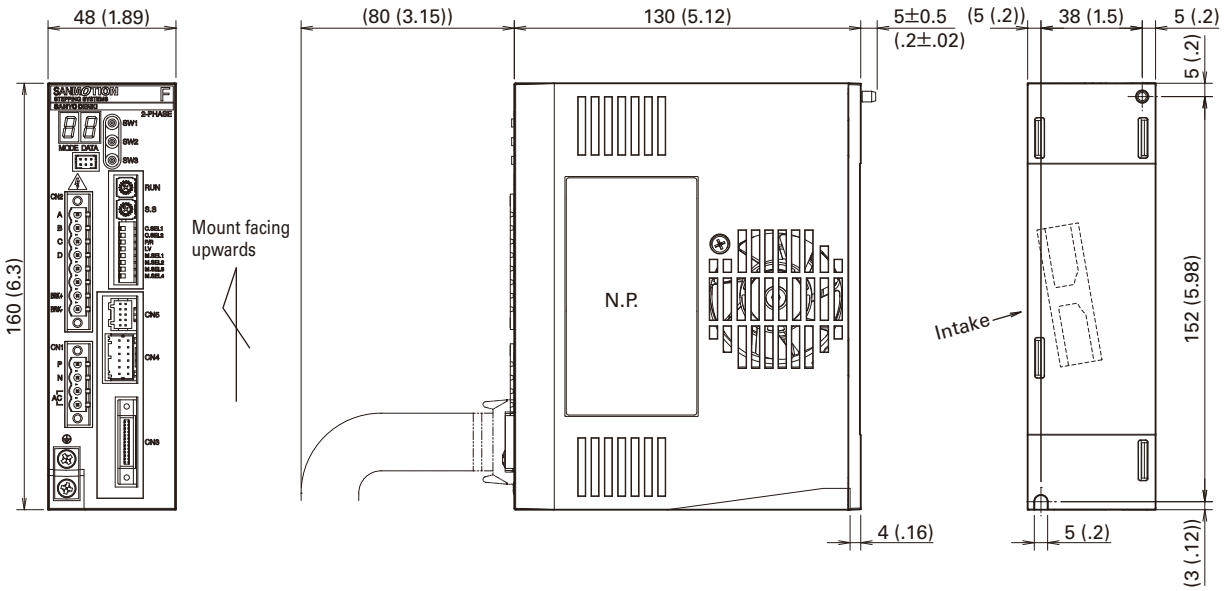


Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

		Lead wire color			
		Red	Blue	Yellow	Orange
Exciting order	1	–	–	+	+
	2	+	–	–	+
	3	+	+	–	–
	4	–	+	+	–

Driver Dimensions [Unit: mm (inch)]



Driver Specifications

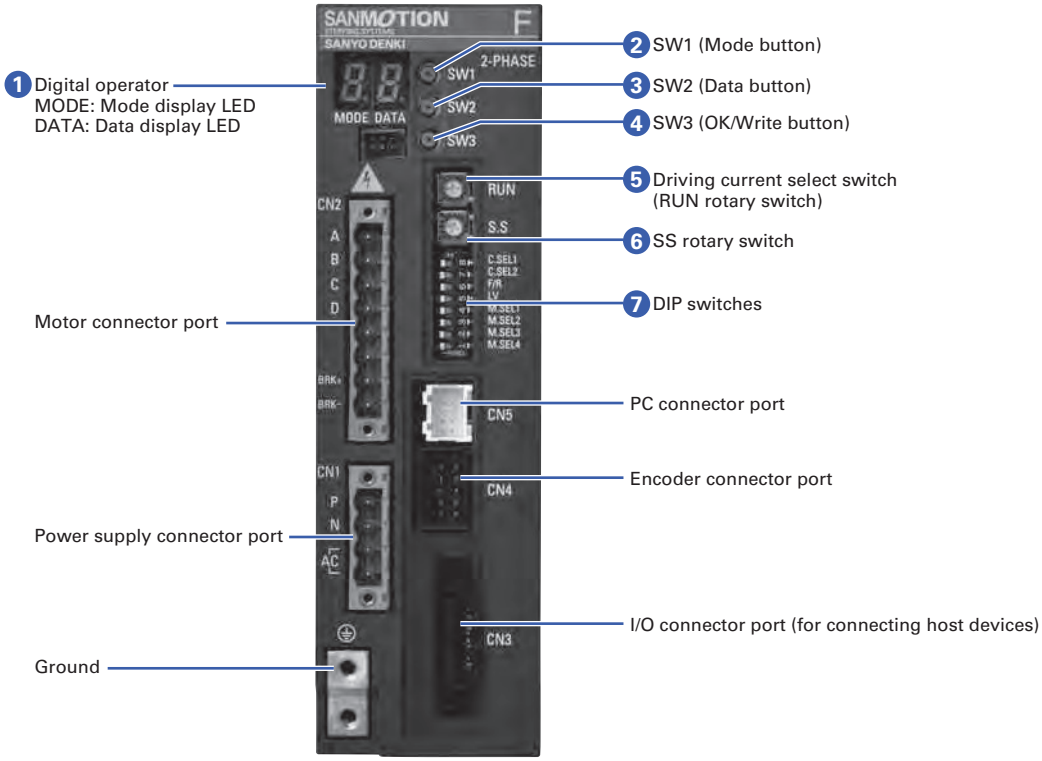
General specifications

Basic specifications		Model number	**F2BAW200M100**	**F2BAW400M100**
		Input source	Single Phase 100 to 240 VAC +10, -15%, 50/60 Hz	
		Source current	5 A	10 A
	Environment	Protection class	Class Ⅰ	
		Operation environment	Installation category (over-voltage category): Ⅱ, pollution degree: 2	
		Ambient operation temperature	0 to + 50℃	
		Conservation temperature	− 20 to + 70℃	
		Operating ambient humidity	90% RH or less (no condensation)	
		Conservation humidity	90% RH or less (no condensation)	
		Operation altitude	1000 m (3281 feet) or less above sea level	
		Vibration resistance	Tested under the following conditions: 5 m/s² frequency range 10 to 55 Hz, direction along X, Y and Z axes, for 2 hours each	
		Impact resistance	20 m/s²	
		Withstandable voltage	Not influenced when 1.5 kVAC is applied between power input terminal and cabinet for one minute.	
		Insulation resistance	10 M Ω min. when measured with 500 VDC megohmmeter between input terminal and cabinet.	
		Mass (Weight)	0.8 kg (0.20 lbs)	
Functions		Selection functions	Control mode, input pulse type, low-vibration mode, motor select, step angle, driving current	
		Protection functions	Overvoltage protection, power supply voltage reduction protection, overheat protection, overcurrent protection	
		LED indication	Status display, alarm display	
I/O signals		Command pulse input signal	Line receiver input system, maximum input frequency: 400 kpulse/s	
		Input signal	From the photocoupler by the open collector output Output specification: Vceo = 4.75 to 26.4 V	
		Output signal	From the photocoupler by the open collector output Output specification: Vceo = 4.75 to 26.4 V	

Safety standards

CE (TÜV)	Directives	Standard	Name
	Low-voltage directives	EN61800-5-1	—
	EMC directives	EN61800-3	—
UL	Acquired standards	Applicable standard	File No.
	UL	UL508C	E179775
	UL for Canada (c-UL)		
KC Mark (Korea Certification Mark)	Standard		
	KN61000-6-2, KN61000-6-4		

Driver Controls and Connectors



1 Digital operator

Allows specific parameters to be set, and for jog operations.

• MODE (Mode display LED)

Displays the current mode number.

MODE	Functions	Data range (DATA display)
0	Driver status display	Displays the driver status
1	Closed control gain settings	0-F (small to large)
2	Feed-forward gain settings	0-A (10%/LSB)
3	Deviation-free control gain settings	0-F (small to large)
4	Current settings when stopped	0-F (100%-25%)
5	Step division mode settings	2=2-phase; 5=5-phase
6	Step division 2 settings	0-F (same as SS rotary switch)
7	Hold brake	0=release; 1=hold
8	Jog operation speed	1-F (100 pps/LSB)
9	Jog operation	—
A	Alarm code display	Displays the alarm code

• DATA (data display LED)

Displays monitor and parameter setting values. Blinks when the displayed parameter setting value is different from the current setting value.

2 SW1 (Mode button)
3 SW2 (Data button)
4 SW3 (OK/Write button)

Used for each setting in conjunction with the digital operator. See the operation manual for details on the settings. Download the necessary manual from the Product Information page on our website.

5 Driving current select switch (RUN rotary switch)

Sets the driving current.

Dial	0	1	2	3	4	5	6	7
Stepping motor current (%)	100	95	90	85	80	75	70	65
Dial	8	9	A	B	C	D	E	F
Stepping motor current (%)	60	55	50	45	40	35	30	25

· The factory setting is 0 (100%).

6 SS rotary switch

Sets the step division 1 settings.

SS setting value	0	1	2	3	4	5	6	7
[P/R]	200	400	800	1000	1600	2000	3200	5000
SS setting value	8	9	A	B	C	D	E	F
[P/R]	6400	10000	12800	20000	25000	25600	50000	51200

· The factory setting is 0.
· Step division 1 and step division 2 can be used while switching with the I/O signal.

7 DIP switches

Sets the control mode, input pulse type, low-vibration mode, and motor select.

SW No.	Symbol	Functions
8	C.SEL1	Control mode select
7	C.SEL2	
6	F/R	Input pulse type select
5	LV	Low-vibration mode select
4	M.SEL1	Motor select
3	M.SEL2	
2	M.SEL3	
1	M.SEL4	

· Set the DIP switches while the power supply is shut off. These settings cannot be changed after the power has been turned on.

Control mode select

Select the stepping motor control mode.

SW7	SW8	Control mode
C.SEL2	C.SEL1	
OFF	OFF	Open-loop control
OFF	ON	Analysis mode*
ON	OFF	Closed-loop control*
ON	ON	Deviation-free closed-loop control*

*An optional motor with encoder is required for modes other than open-loop control.

- Open-loop control
  Controls general stepping motors.
- Analysis mode
  The optional encoder allows you to detect step-out, monitor speed, and monitor current position, etc.
- Closed-loop control
  Performs closed-loop control based on feedback from the encoder. Since the motor current is optimally controlled by matching the load, heat buildup and current consumption are both reduced. As this operates with positional deviation, use the following deviation-free closed-loop control on devices that require synchronization with pulse commands.
- Deviation-free closed-loop control
  Performs closed-loop control based on feedback from the encoder. Although the motor current is controlled according to the load, a control to lessen positional deviation has been added.

[Positional deviation]

Open-loop control and analysis mode < Deviation-free closed-loop control << Closed-loop control

[Heat buildup, current consumption]

Closed-loop control < Deviation-free closed-loop control < Open-loop control and analysis mode

Input pulse type select

Select the input pulse type.

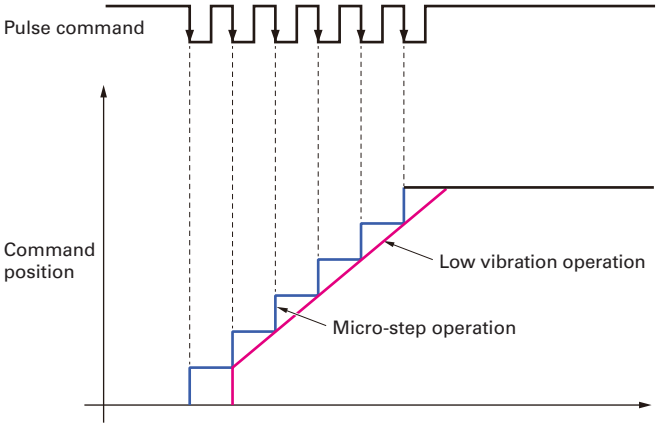
SW6	Input pulse type
F/R	
OFF	2-input type (CW pulse/CCW pulse)
ON	1-input type (Pulse/Direction)

Low-vibration mode select

Allows for smooth operation with low vibrations, even with step division set at coarse resolution.

SW5	Operation
LV	
OFF	Micro-step operation
ON	Low vibration operation

During low vibration operation, operational processes for the driving pulse will be carried out inside the driver. For this reason, motor movement will be delayed by 1 pulse for each input pulse.



Motor select

Select a motor to be used with the driver.

Driver model number: F2BAW200M100

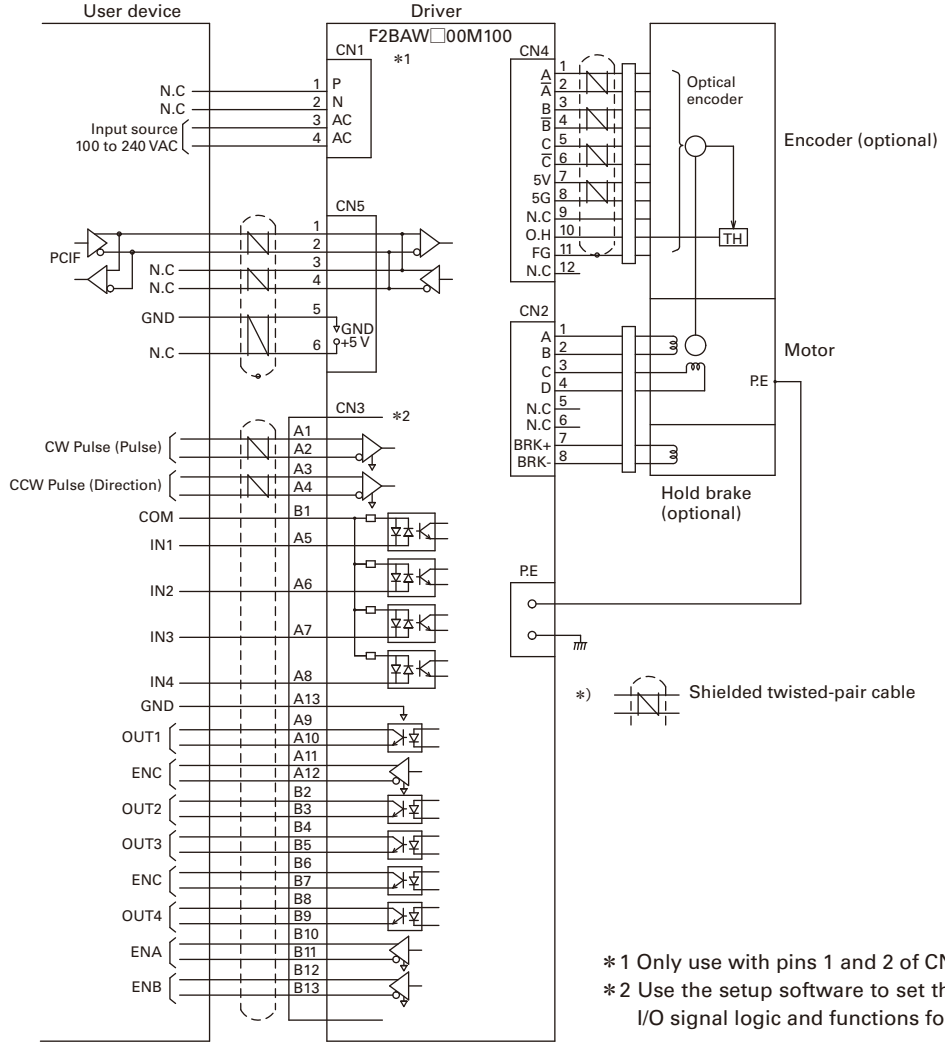
SW1	SW2	SW3	SW4	Motor model number	Remarks
M.SEL4	M.SEL3	M.SEL2	M.SEL1		
OFF	OFF	OFF	ON	103F5208	100 VAC input only
OFF	ON	ON	OFF	103F7821	
OFF	ON	ON	ON	103F7822	
ON	OFF	OFF	OFF	103F7823	
ON	OFF	OFF	ON	SH2861	
ON	OFF	ON	OFF	SH2862	
ON	OFF	ON	ON	SH2863	
Other settings				Reserved	

Driver model number: F2BAW400M100

SW1	SW2	SW3	SW4	Motor model number	Remarks
M.SEL4	M.SEL3	M.SEL2	M.SEL1		
OFF	ON	ON	OFF	103F7821	
OFF	ON	ON	ON	103F7822	
ON	OFF	OFF	OFF	103F7823	
ON	OFF	OFF	ON	SH2861	
ON	OFF	ON	OFF	SH2862	
ON	OFF	ON	ON	SH2863	
Other settings				Reserved	

Connections and Signals

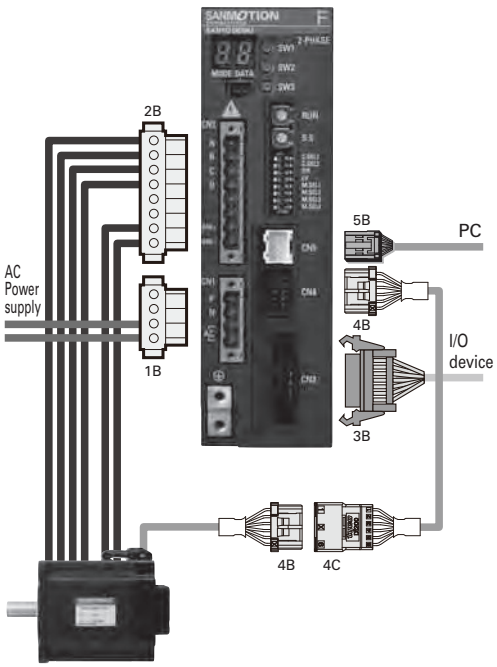
External wiring diagram



*1 Only use with pins 1 and 2 of CN1 open.
*2 Use the setup software to set the general-purpose I/O signal logic and functions for CN3.

Wiring

Connector model, compatible wires



Applicable use	Code	Name	Model	Compatible wires	Maximum extension	Manufacturer
Power supply	CN1	Socket	MSTBT 2,5/4-GF-5,08	AWG18 Discrete line	2 m	PHOENIX CONTACT
	1B	Plug	MSTBT 2,5/4-STF-5,08			
Power, brakes	CN2	Socket	MSTBT 2,5/8-GF-5,08	AWG18 to 22 Discrete line	20 m	PHOENIX CONTACT
	2B	Plug	MSTBT 2,5/8-STF-5,08			
I/O	CN3	Plug	8831E-026-170LD-F	AWG28 (7/0.127)	2 m	KEL CORPORATION
	3B	Receptacle	8822E-026-171D			
encoder	CN4	Tab header	1-1827876-6	AWG22 to 28 Shielded twisted-pair* *The contact model number varies by jacket dimension.	20 m	Tyco Electronics Japan G.K.
	4B	Recessed housing	1-1827864-6			
		Recessed contact	1827569-2 (AWG28 to 30) 1827570-2 (AWG22 to 28)			
	4C	Tab housing	1-1903130-6			
		Tab contact	1903111-2 (AWG28 to 30) 1903112-2 (AWG22 to 28)			
Communications	CN5	Post with base	S10B-PADSS-1GW	AWG28 to 24 Shielded twisted-pair	2 m	J.S.T Mfg Co., Ltd.
	5B	housing	PADP-10V-1-S			
		Contact	SPH-002GW-P0.5S			

- Refer to the manufacturer's catalog for the detailed connector specifications.
- If the length will exceed the maximum extension, take precautions to ensure that the unit does not malfunction due to line noise.

Wiring

Power supply connector (CN1)

Pin No.	Symbol	Signal name
1	P	—
2	N	—
3	AC	AC
4	AC	AC

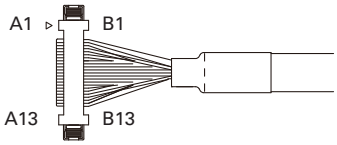
- Do not wire the motor power line, I/O cable, or encoder cable together with the power cable inside the same duct.
- Make sure to wait for at least 1 minute after shutting down the power, before plugging or unplugging the power cable. Failure to do so may cause damage to the driver.
- Select the appropriate breaker, electromagnetic contactor, and noise filter after referring to the details in the Operation Manual on power supply current, inrush current, and leakage current.

Power connector (CN2)

Pin No.	Symbol	Signal name	Lead wire color
1	A	Power A phase	Orange
2	B	Power $\overline{A}$ phase	Blue
3	C	Power B phase	Red
4	D	Power $\overline{B}$ phase	Yellow
5	—	—	—
6	—	—	—
7	BRK+	Hold brake +	White
8	BRK-	Hold brake −	Black

- The color of the lead wires on the hold brake vary with the polarity. Hold brakes without polarity use the same lead wire color.
- The power supply for the hold brake is inside of the driver. The hold brake is automatically controlled by the driver.
- Make sure to wait for at least 1 minute after shutting down the power before plugging or unplugging the power lines. Failure to do so may cause damage to the driver.

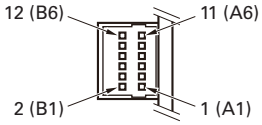
I/O signal connector (CN3)



Pin No.	Signal name	Functions	Lead wire color	Mark display	Mark color
A1	Pulse/+Pulse	Forward-direction pulse/pulse	Orange		Red
A2	Pulse/+Pulse				Black
A3	DIR/-Pulse	Reverse-direction pulse/direction	Gray		Red
A4	DIR/-Pulse				Black
A5	IN1	General-purpose input 1	White		Red
A6	IN2	General-purpose input 2			Black
A7	IN3	General-purpose input 3	Yellow		Red
A8	IN4	General-purpose input 4			Black
A9	OUT1+	General-purpose output 1	Pink		Red
A10	OUT1-				Black
A11	ENC+	Encoder C	Orange		Red
A12	ENC-				Black
A13	GND	Signal ground	Gray		Red
B1	+/-COM	Common			Black
B2	OUT2+	General-purpose output 2	White		Red
B3	OUT2-				Black
B4	OUT3+	General-purpose output 3	Yellow		Red
B5	OUT3-				Black
B6	ENC+	Encoder C	Pink		Red
B7	ENC-				Black
B8	OUT4+	General-purpose output 4	Orange		Red
B9	OUT4-				Black
B10	ENA+	Encoder A	Gray		Red
B11	ENA-				Black
B12	ENB+	Encoder B	White		Red
B13	ENB-				Black

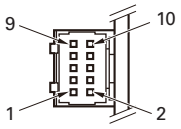
- Optional setup software and communications unit are required to set the I/O signal logic and functions.

Encoder connector (CN4)



Pin No.	Signal name	Lead wire color
1 (A1)	A phase +	Blue
2 (B1)	A phase −	Brown
3 (A2)	B phase +	Green
4 (B2)	B phase −	Purple
5 (A3)	C phase +	White
6 (B3)	C phase −	Yellow
7 (A4)	VCC	Red
8 (B4)	GND	Black
9 (A5)	—	—
10 (B5)	Motor overheat detection	Orange
11 (A6)	FG	Black
12 (B6)	—	—

Communications connector (CN5)

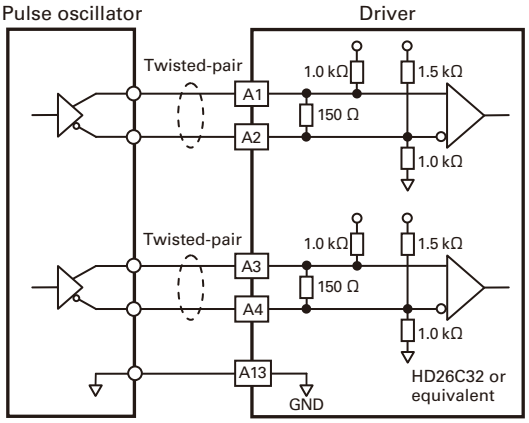


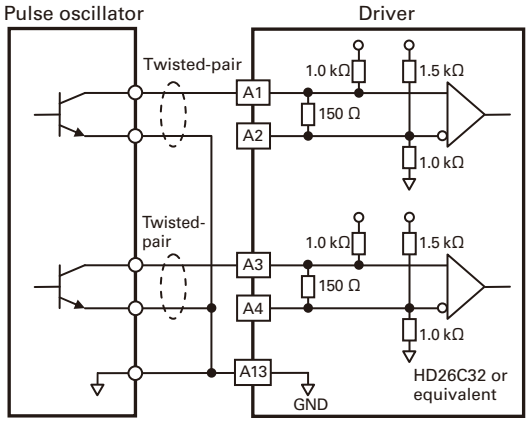
Pin No.	Signal name	Lead wire color
1	A	Yellow
2	B	White
3	(A)	—
4	(B)	—
5	GND	Black
6	(VCC)	—
7	—	—
8	—	—
9	—	—
10	—	—

Pulse Command Input

Connection example

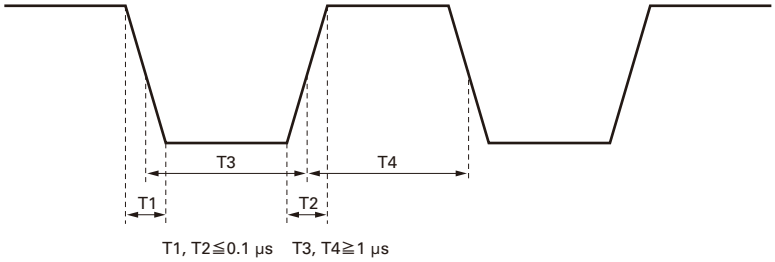
Connection to line driver output	Connect to open collector output
Applicable line driver: HD26C31 or equivalent Make sure that GND is connected. Failure to do so may cause malfunction or damage.	Make sure that GND is connected. Failure to do so may cause malfunction or damage due to noise.





Pulse waveform

Maximum response frequency: 400 kpulse/s

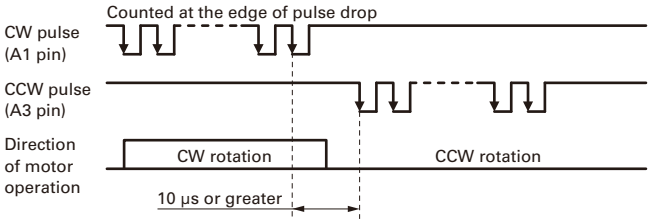


T1, T2≦0.1 μs T3, T4≧1 μs

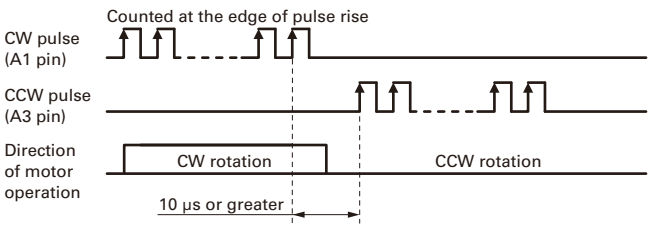
・Note that the unit cannot be operated at maximum speed if the step division is high due to maximum response frequency limits.

Timing chart

◆ 2-input type (negative logic)

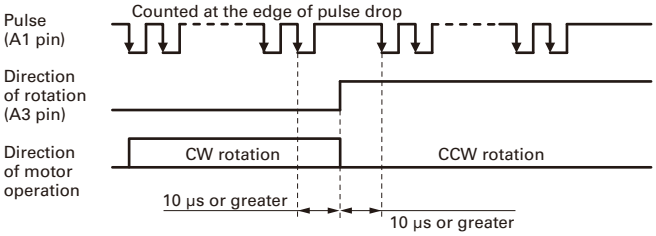


◆ 2-input type (positive logic)

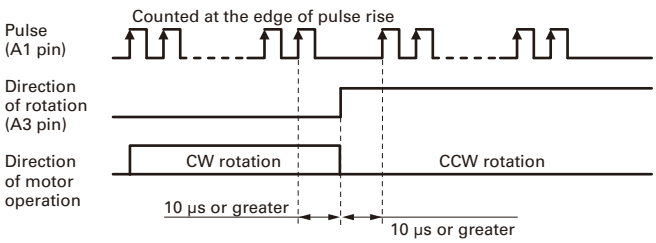


・CW rotation means rotation in a clockwise direction when viewed from the motor flange side; and CCW rotation means rotation in a counterclockwise direction when viewed from the motor flange side.
・Do not input CW/CCW pulses at the same time.
・The CW/CCW pulse switching time of "10 μs or greater" is the operating time for the driver internal circuit, not the motor response time. Set a time in which the motor can respond for actual operations.

◆ 1-input type (negative logic)



◆ 1-input type (positive logic)



・CW rotation means rotation in a clockwise direction when viewed from the motor flange side; and CCW rotation means rotation in a counterclockwise direction when viewed from the motor flange side.
・The rotating direction switching time of "10 μs or greater" is the operating time for the driver internal circuit, not the motor response time. Set a time in which the motor can respond for actual operations.

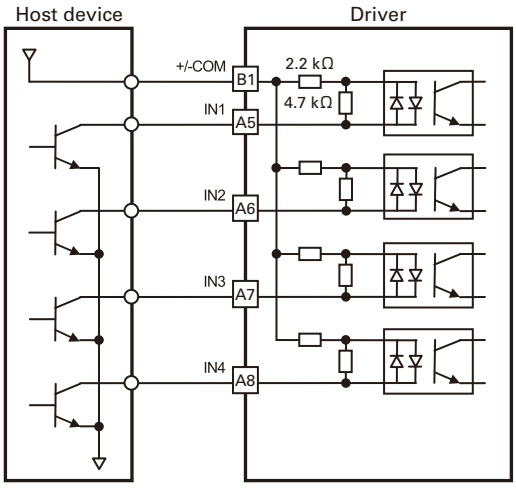
・Either positive or negative logic can be switched and selected using a parameter. The factory preset is negative logic.
・1-input type and 2-input type can be switched by setting the DIP switch.

General-purpose Input

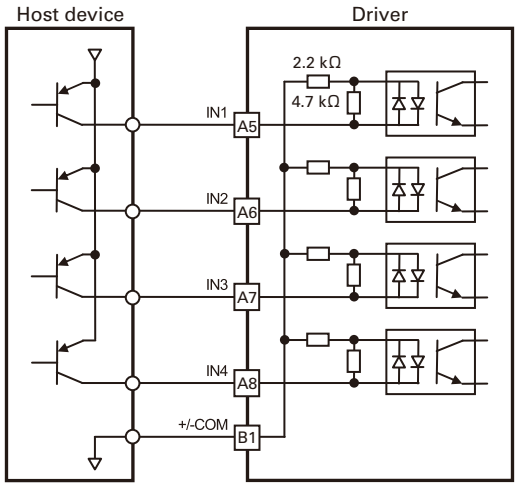
Connection example

Power supply voltage range	5 to 24 VDC

With host device current sync output



With host device current source output

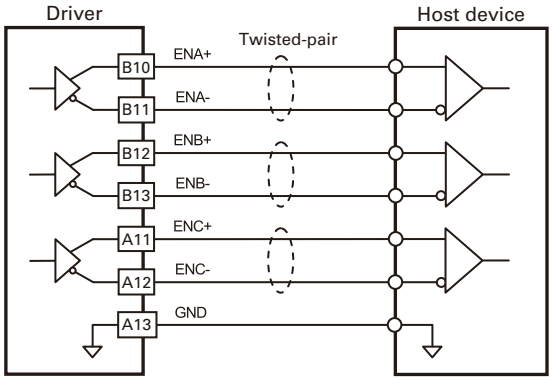


Encoder Output (The motor with encoder is optional.)

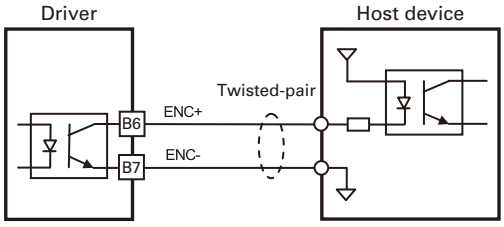
Connection example

Line driver output

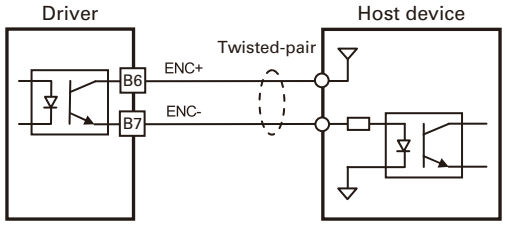
Applicable line receiver: HD26C32 or equivalent
Make sure that GND is connected. Failure to do so may cause damage or malfunction due to noise.



When used with ENC sync output



When used with ENC source output

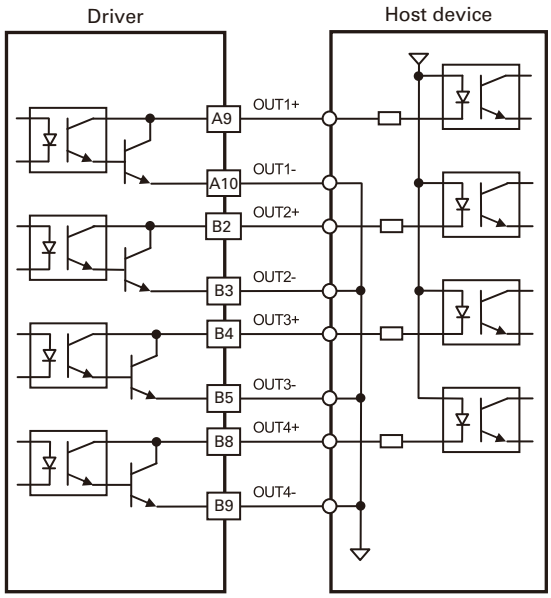


General-purpose Output

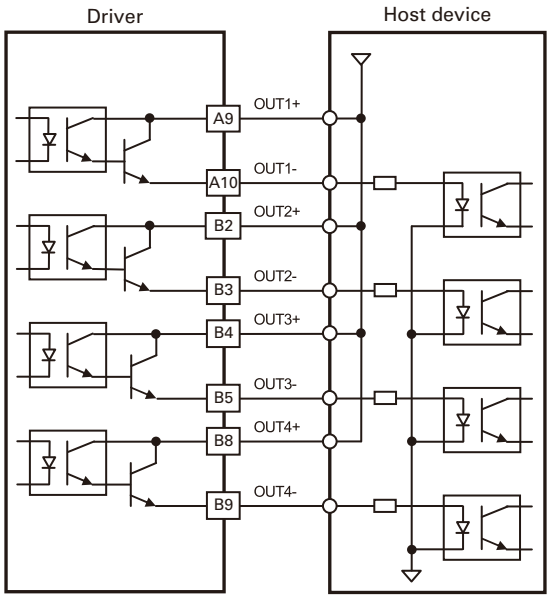
Connection example

Power supply voltage range	5 to 24 VDC	
Maximum current	When used at 24 VDC	50 mA (maximum saturation voltage: 3.5 V or lower)
	When used at 12 VDC	30 mA (maximum saturation voltage: 3.0 V or lower)
	When used at 5 VDC	10 mA (maximum saturation voltage: 2.0 V or lower)

When used with sync output



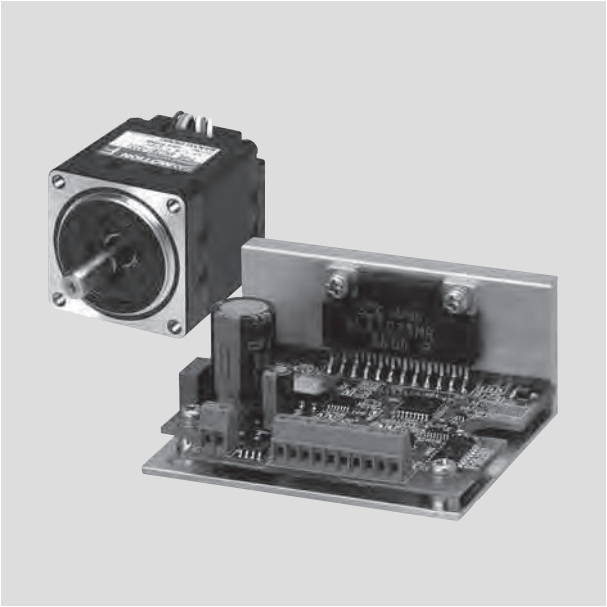
When used with source output



DC Input Set Models

Unipolar, Bipolar

Set Model Configuration ▶ p. 32
Specifications/Characteristics Diagram ▶ pp. 33 to 40
Motor Dimensions ▶ pp. 41 to 42 Motor Specifications ▶ p. 43
Driver Dimensions ▶ p. 44 Driver Specifications ▶ p. 45



Set configuration items RoHS

Driver Terminal block type

Unipolar Model number: US1D200P10 Input source: 24/36 VDC
Bipolar Model number: BS1D200P10 Input source: 24/36 VDC
・The operation manual can be downloaded from our website.
・Drivers are available for separate purchase.
Connector-type drivers are also available. Contact us for details.

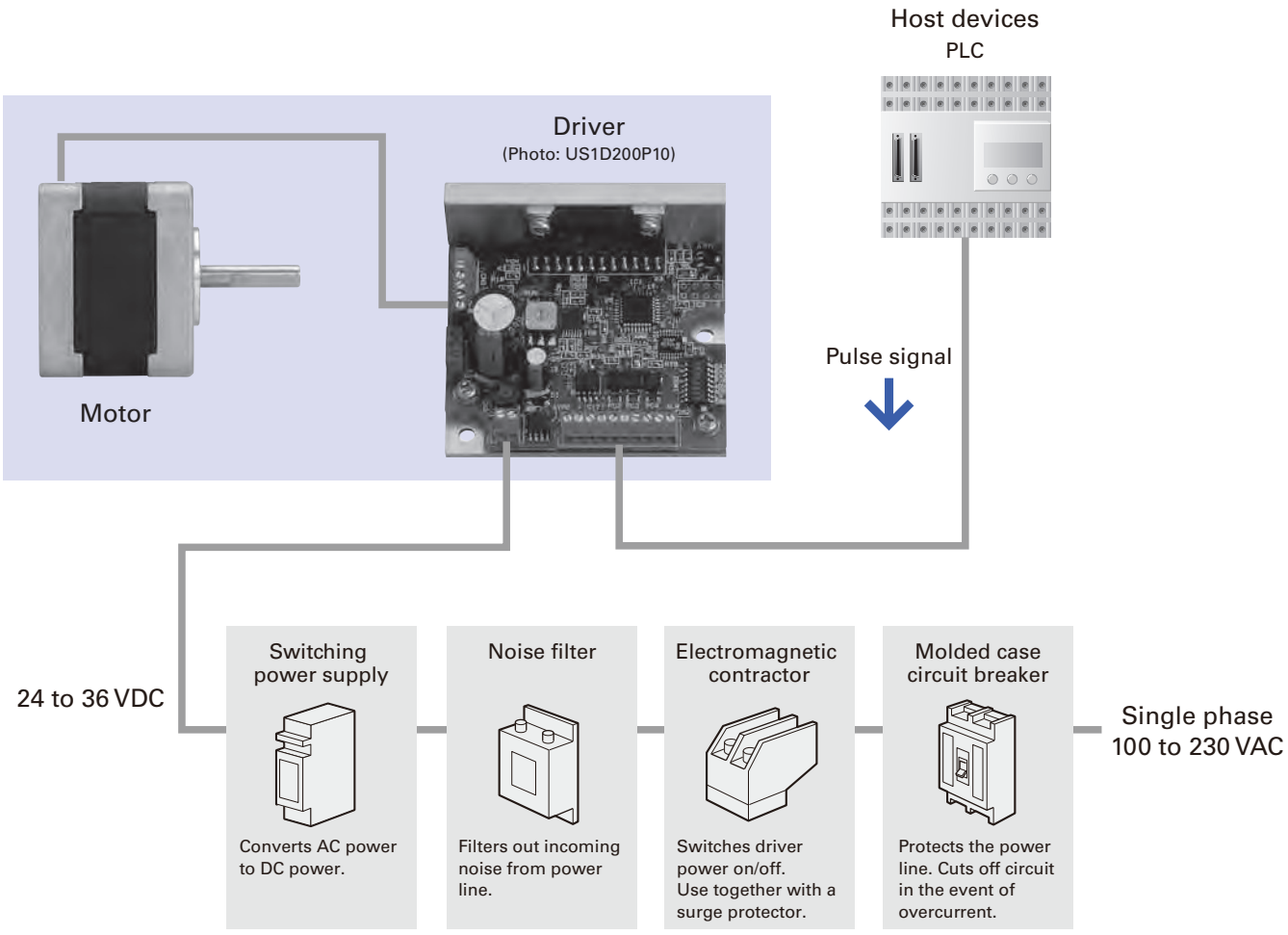
Motor

Unipolar Motor size: 28 mm sq. (1.10 inch sq.), 42 mm sq. (1.65 inch sq.), 56 mm sq. (2.20 inch sq.)

Bipolar Motor size: 28 mm sq. (1.10 inch sq.), 42 mm sq. (1.65 inch sq.), 50 mm sq. (1.97 inch sq.), 56 mm sq. (2.20 inch sq.), 60 mm sq. (2.36 inch sq.)

Cable with connector (Supplied only with connector-type motors)

System Configuration Diagram



Set Model Numbering Convention

Not every combination of the following codes or characters is available. Check the set model component details on the p. 32 for the model number combinations, or contact us.

Example: This is a set model number for the AC input driver (model number: US1D200P10) and motor (model number: 103H7121-0440). The motor specifications are motor size: 56 mm sq. (2.20 inch sq.), motor length: 41.8 mm (1.65 inch), single shaft.

Stepping motor shaft specification
S: Single shaft
D: Dual shaft

Stepping motor total length

Code	Stepping motor size													
	28 mm sq. (1.10 in sq.)		42 mm sq. (1.65 in sq.)				50 mm sq. (1.97 in sq.)		56 mm sq. (2.20 in sq.)		60 mm sq. (2.36 in sq.)			
	Type code	Motor length: mm (in)	Type code	Motor length: mm (in)	Type code	Motor length: mm (in)	Type code	Motor length: mm (in)	Type code	Motor length: mm (in)	Type code	Motor length: mm (in)	Type code	Motor length: mm (in)
1	SH2281	32 (1.26)	103H5205	33 (1.30)	SH1421	33 (1.30)	103H6701	39.8 (1.57)	103H7121	41.8 (1.65)	103H7821	44.8 (1.76)	SH1601	42 (1.65)
2			103H5208	39 (1.54)	SH1422	39 (1.54)					103H7822	53.8 (2.12)	SH1602	54 (2.12)
3							103H6703	51.3 (2.02)	103H7123	53.8 (2.12)	103H7823	85.8 (3.38)		
4			103H5210	48 (1.89)	SH1424	48 (1.89)								
5	SH2285	51.5 (2.03)												
6									103H7126	75.8 (2.89)				

Stepping motor size — Basic step angle
28: 28 mm sq. (1.10 inch sq.) — 1.8°
52: 42 mm sq. (1.65 inch sq.) — 1.8°
14: 42 mm sq. (1.65 inch sq.) — 0.9°
67: 50 mm sq. (1.97 inch sq.) — 1.8°
71: 56 mm sq. (2.20 inch sq.) — 1.8°
78: 60 mm sq. (2.36 inch sq.) — 1.8°
16: 60 mm sq. (2.36 inch sq.) — 0.9°

Stepping motor series name
H: H series
S: SH series

Rated current specification
4: 1 A/phase 5: 1.2 A/phase 6: 2 A/phase

Model

Driver specification
U: Unipolar B: Bipolar

D: DC input

Set Model Configuration

This set includes the driver, motor and cable with motor connector.

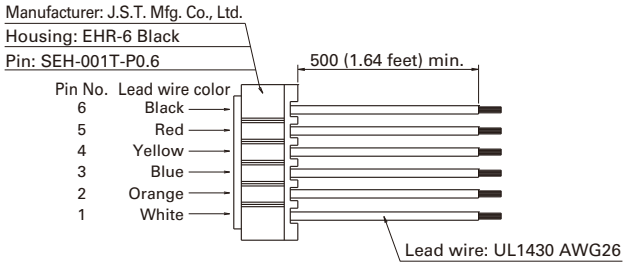
Unipolar Bundled driver model number: US1D200P10

Motor size	Single shaft				Dual shaft				Basic step angle	Rated current (A/phase)	Page	
	Set model number	Set configuration items			Set model number	Set configuration items						
		Motor model number		Cable with motor connector model number		Motor model number		Cable with motor connector model number			Specifications	Dimensions
28 mm sq.	DU14S281S	SH2281-5271	L	—	DU14S281D	SH2281-5231	L	—	1.8°	1	p. 33	p. 41
	DU14S285S	SH2285-5271	L	—	DU14S285D	SH2285-5231	L	—	1.8°	1	p. 33	p. 41
42 mm sq.	DU15H521S	103H5205-0440	C	4835710-1	DU15H521D	103H5205-0410	C	4835710-1	1.8°	1.2	p. 33	p. 41
	DU15H522S	103H5208-0440	C	4835710-1	DU15H522D	103H5208-0410	C	4835710-1	1.8°	1.2	p. 33	p. 41
	DU15H524S	103H5210-0440	C	4835710-1	DU15H524D	103H5210-0410	C	4835710-1	1.8°	1.2	p. 34	p. 41
	DU15S141S	SH1421-0441	L	—	DU15S141D	SH1421-0411	L	—	0.9°	1.2	p. 34	p. 41
	DU15S142S	SH1422-0441	L	—	DU15S142D	SH1422-0411	L	—	0.9°	1.2	p. 34	p. 41
	DU15S144S	SH1424-0441	L	—	DU15S144D	SH1424-0411	L	—	0.9°	1.2	p. 34	p. 41
56 mm sq.	DU16H711S	103H7121-0440	L	—	DU16H711D	103H7121-0410	L	—	1.8°	2	p. 35	p. 42
	DU16H713S	103H7123-0440	L	—	DU16H713D	103H7123-0410	L	—	1.8°	2	p. 35	p. 42
	DU16H716S	103H7126-0440	L	—	DU16H716D	103H7126-0410	L	—	1.8°	2	p. 35	p. 42

Motors marked with an Ⓛ are lead wire types. Either a 300 mm (11.81 inch) or a 305 mm (12.01 inch) or greater lead wire is attached to the motor.
Motors marked with a Ⓒ are connector types. Cables with connectors for motors as shown below are included.

● Cable with motor connector (Supplied only with connector-type motors)

Bundled cable (Unipolar 42 mm sq. (1.65 inch sq.) motors only, model number: 4835710-1)



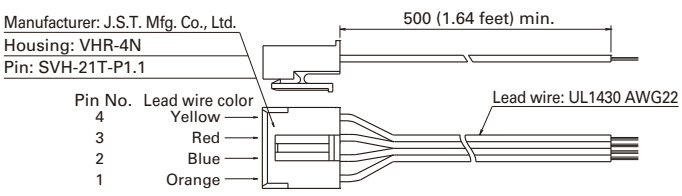
Bipolar Bundled driver model number: BS1D200P10

Motor size	Single shaft				Dual shaft				Basic step angle	Rated current (A/phase)	Page	
	Set model number	Set configuration items			Set model number	Set configuration items						
		Motor model number		Cable with motor connector model number		Motor model number		Cable with motor connector model number			Specifications	Dimensions
28 mm sq.	DB14S281S	SH2281-5771	L	—	DB14S281D	SH2281-5731	L	—	1.8°	1	p. 36	p. 41
	DB14S285S	SH2285-5771	L	—	DB14S285D	SH2285-5731	L	—	1.8°	1	p. 36	p. 41
42 mm sq.	DB14H521S	103H5205-5240	L	—	DB14H521D	103H5205-5210	L	—	1.8°	1	p. 36	p. 41
	DB14H522S	103H5208-5240	L	—	DB14H522D	103H5208-5210	L	—	1.8°	1	p. 36	p. 41
	DB14H524S	103H5210-5240	L	—	DB14H524D	103H5210-5210	L	—	1.8°	1	p. 37	p. 41
	DB16S141S	SH1421-5241	L	—	DB16S141D	SH1421-5211	L	—	0.9°	2	p. 37	p. 41
	DB16S142S	SH1422-5241	L	—	DB16S142D	SH1422-5211	L	—	0.9°	2	p. 37	p. 41
	DB16S144S	SH1424-5241	L	—	DB16S144D	SH1424-5211	L	—	0.9°	2	p. 37	p. 41
50 mm sq.	DB16H671S	103H6701-5040	L	—	DB16H671D	103H6701-5010	L	—	1.8°	2	p. 38	p. 42
	DB16H673S	103H6703-5040	L	—	DB16H673D	103H6703-5010	L	—	1.8°	2	p. 38	p. 42
56 mm sq.	DB16H711S	103H7121-5740	L	—	DB16H711D	103H7121-5710	L	—	1.8°	2	p. 38	p. 42
	DB16H713S	103H7123-5740	L	—	DB16H713D	103H7123-5710	L	—	1.8°	2	p. 38	p. 42
	DB16H716S	103H7126-5740	L	—	DB16H716D	103H7126-5710	L	—	1.8°	2	p. 39	p. 42
60 mm sq.	DB16H781S	103H7821-5740	C	4837961-1	DB16H781D	103H7821-5710	C	4837961-1	1.8°	2	p. 39	p. 42
	DB16H782S	103H7822-5740	C	4837961-1	DB16H782D	103H7822-5710	C	4837961-1	1.8°	2	p. 39	p. 42
	DB16H783S	103H7823-5740	C	4837961-1	DB16H783D	103H7823-5710	C	4837961-1	1.8°	2	p. 39	p. 42
	DB16S161S	SH1601-5240	L	—	DB16S161D	SH1601-5210	L	—	0.9°	2	p. 40	p. 42
	DB16S162S	SH1602-5240	L	—	DB16S162D	SH1602-5210	L	—	0.9°	2	p. 40	p. 42

Motors marked with an Ⓛ are lead wire types. Either a 300 mm (11.81 inch) or a 305 mm (12.01 inch) or greater lead wire is attached to the motor.
Motors marked with a Ⓒ are connector types. Cables with connectors for motors as shown below are included.

● Cable with motor connector (Supplied only with connector-type motors)

Bundled cable (Bipolar 60 mm sq. (2.36 inch sq.) motors only, model number: 4837961-1)



Unipolar DC input driver (Model No.: US1D200P10) + Motor

RoHS

Size			28 mm sq. (1.10 in sq.)/Basic step angle 1.8°		42 mm sq. (1.65 in sq.)/Basic step angle 1.8°	
	Motor size		32 mm (1.26 in)	51.5 mm (2.03 in)	33 mm (1.30 in)	39 mm (1.89 in)
Single shaft	Set model number		DU14S281S	DU14S285S	DU15H521S	DU15H522S
	Configuration item: motor number		SH2281-5271	SH2285-5271	103H5205-0440	103H5208-0440
Dual shaft	Set model number		DU14S281D	DU14S285D	DU15H521D	DU15H522D
	Configuration item: motor number		SH2281-5231	SH2285-5231	103H5205-0410	103H5208-0410
Holding torque		N·m (oz·in)	0.055 (7.79)	0.115 (16.28)	0.2 (28.32)	0.3 (42.48)
Rotor inertia		X 10^{-4}kg·m² (oz·in²)	0.01 (0.05)	0.022 (0.12)	0.036 (0.20)	0.056 (0.31)
Rated current		A/phase	1	1	1.2	1.2
Motor mass *1		kg (lbs)	0.11 (0.24)	0.2 (0.44)	0.23 (0.51)	0.29 (0.64)
Allowable thrust load		N (lbs)	3 (0.67)	3 (0.67)	10 (2.25)	10 (2.25)
Allowable radial load *2		N (lbs)	42 (9.44)	49 (11.02)	26 (5.85)	25 (5.62)

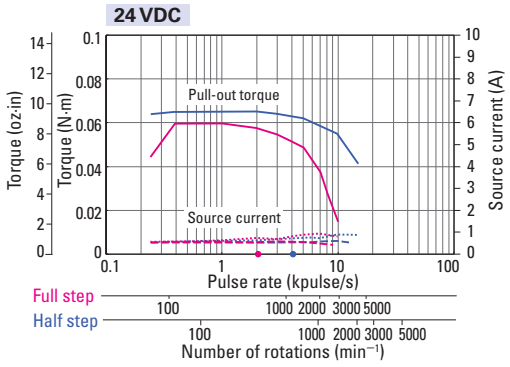
*1 Driver mass ▶p. 45 *2 The load point is at the tip of the output shaft.

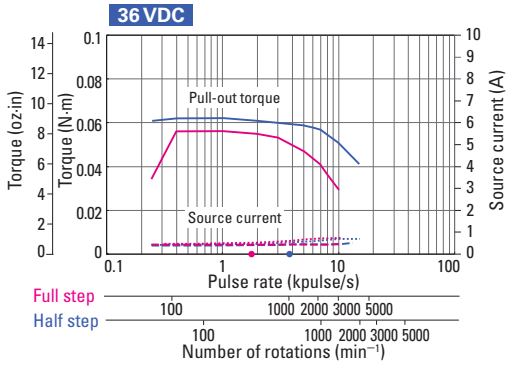
Characteristics diagram

With rubber coupling

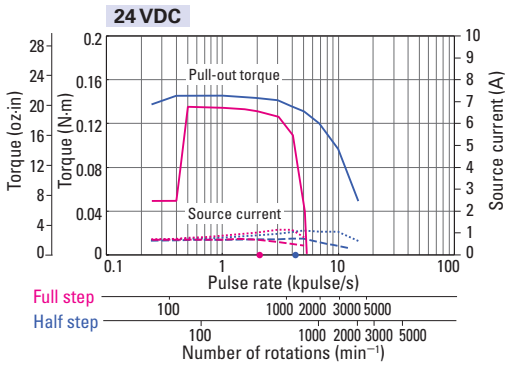
Pull-out torque Full step —— Half step ——
Source current (no load) Full step - - - Half step - - -
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

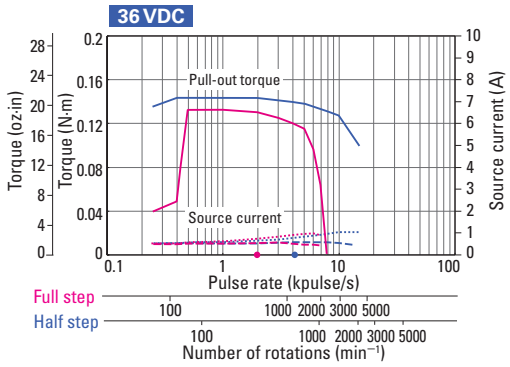
DU14S281S DU14S281D



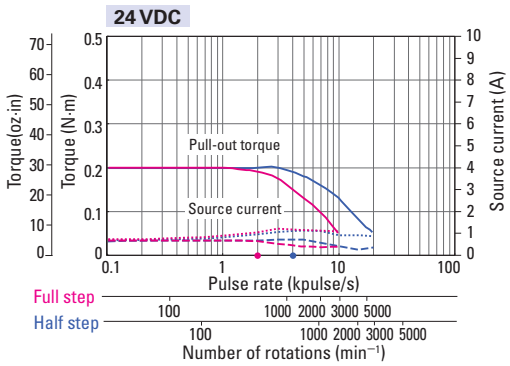


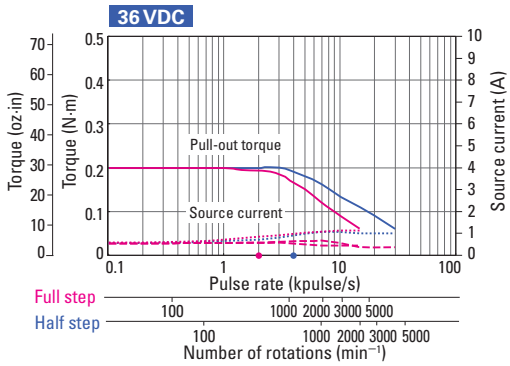
DU14S285S DU14S285D



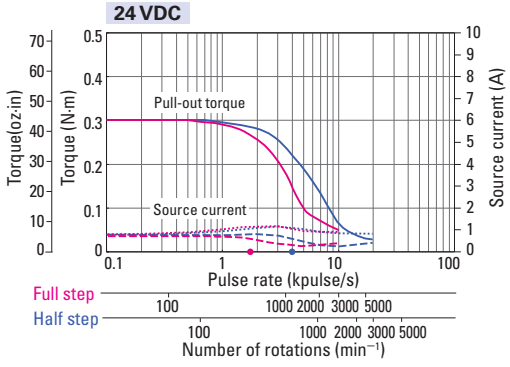


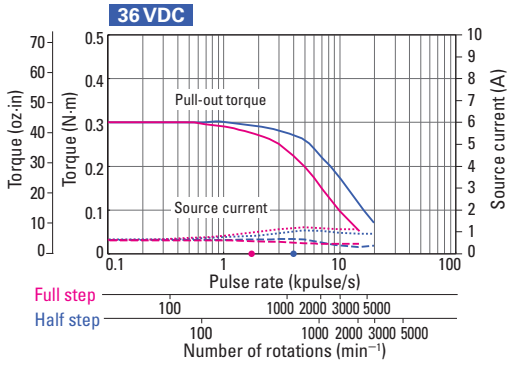
DU15H521S DU15H521D





DU15H522S DU15H522D





System Configuration Diagram▶p. 30 Set Model Configuration▶p. 32 Motor Dimensions▶pp. 41 to 42 Driver Dimensions▶p. 44

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Unipolar DC input driver (Model No.: US1D200P10) + Motor

RoHS

Size			42 mm sq. (1.65 in sq.)/Basic step angle 1.8°	42 mm sq. (1.65 in sq.)/Basic step angle 0.9°		
	Motor length		48 mm (1.89 in)	33 mm (1.30 in)	39 mm (1.54 in)	48 mm (1.89 in)
Single shaft	Set model number		DU15H524S	DU15S141S	DU15S142S	DU15S144S
	Configuration item: motor number		103H5210-0440	SH1421-0441	SH1422-0441	SH1424-0441
Dual shaft	Set model number		DU15H524D	DU15S141D	DU15S142D	DU15S144D
	Configuration item: motor number		103H5210-0410	SH1421-0411	SH1422-0411	SH1424-0411
Holding torque		N·m (oz·in)	0.37 (52.39)	0.2 (28.32)	0.29 (41.07)	0.39 (55.23)
Rotor inertia		X 10^{-4}kg·m² (oz·in²)	0.074 (0.40)	0.044 (0.24)	0.066 (0.361)	0.089 (0.487)
Rated current		A/phase	1.2	1.2	1.2	1.2
Motor mass *1		kg (lbs)	0.37 (0.82)	0.24 (0.53)	0.29 (0.64)	0.38 (0.84)
Allowable thrust load		N (lbs)	10 (2.25)	10 (2.25)	10 (2.25)	10 (2.25)
Allowable radial load *2		N (lbs)	23 (5.17)	25 (5.62)	24 (5.4)	20 (4.5)

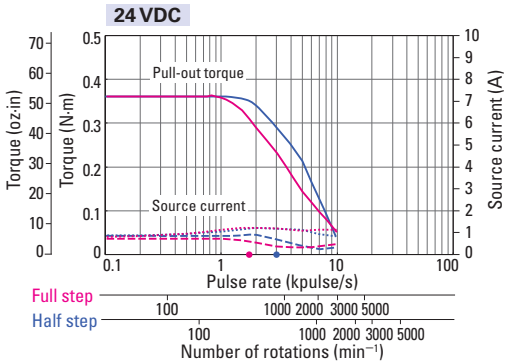
*1 Driver mass ▶p. 45 *2 The load point is at the tip of the output shaft.

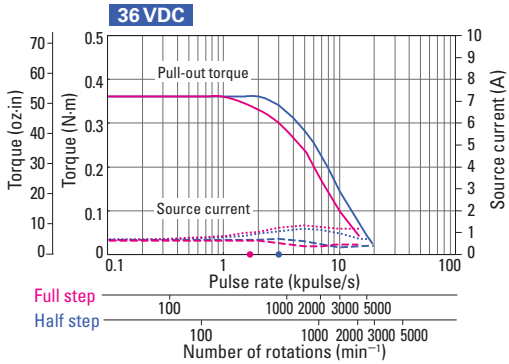
Characteristics diagram

With rubber coupling

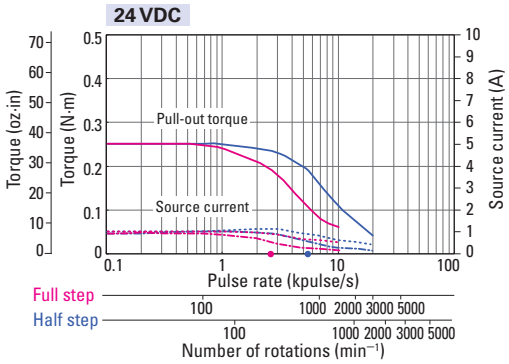
Pull-out torque Full step —— Half step ——
Source current (no load) Full step - - - Half step - - -
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

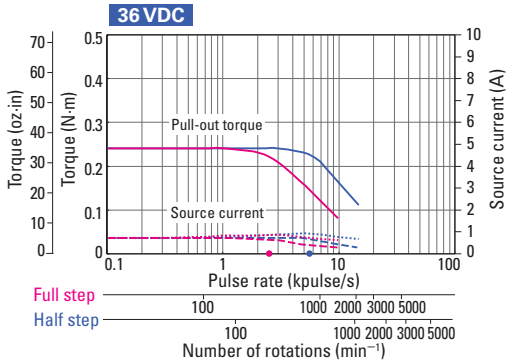
DU15H524S DU15H524D



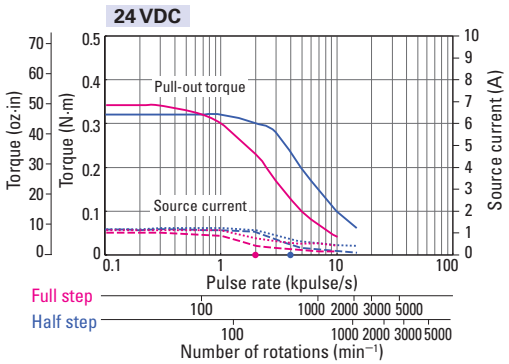


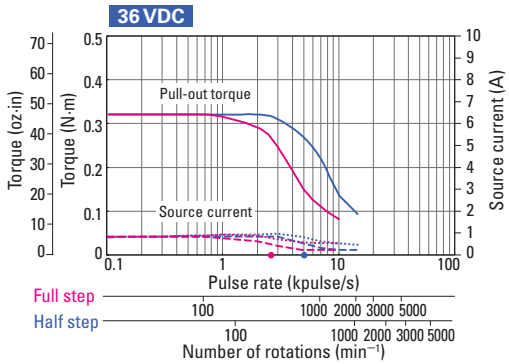
DU15S141S DU15S141D



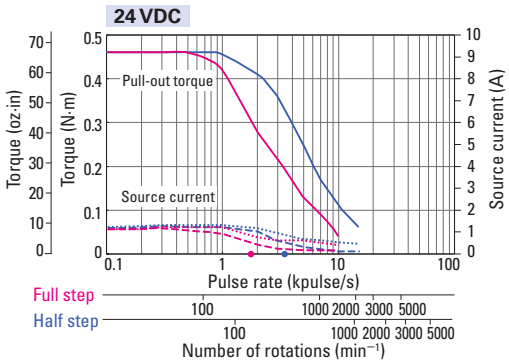


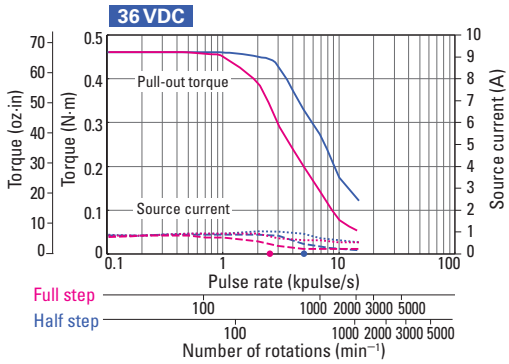
DU15S142S DU15S142D





DU15S144S DU15S144D





System Configuration Diagram▶p. 30 Set Model Configuration▶p. 32 Motor Dimensions▶pp. 41 to 42 Driver Dimensions▶p. 44

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Unipolar DC input driver (Model No.: US1D200P10) + Motor

RoHS

Size	Motor size		56 mm sq. (2.20 in sq.)/Basic step angle 1.8˚		
	Motor length		41.8 mm (1.65 in)	53.8 mm (2.12 in)	75.8 mm (2.98 in)
Single shaft	Set model number		DU16H711S	DU16H713S	DU16H716S
	Configuration item: motor number		103H7121-0440	103H7123-0440	103H7126-0440
Dual shaft	Set model number		DU16H711D	DU16H713D	DU16H716D
	Configuration item: motor number		103H7121-0410	103H7123-0410	103H7126-0410
Holding torque		N·m (oz·in)	0.39 (55.23)	0.83 (117.5)	1.27 (179.8)
Rotor inertia		X 10^{-4}kg·m² (oz·in²)	0.1 (0.55)	0.21 (1.15)	0.36 (1.97)
Rated current		A/phase	2	2	2
Motor mass *1		kg (lbs)	0.47 (1.04)	0.65 (1.43)	0.98 (2.16)
Allowable thrust load		N (lbs)	15 (3.37)	15 (3.37)	15 (3.37)
Allowable radial load *2		N (lbs)	78 (17.54)	71 (15.96)	62 (13.94)

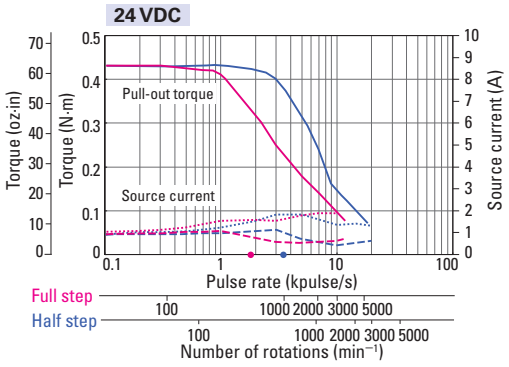
*1 Driver mass ▶p. 45 *2 The load point is at the tip of the output shaft.

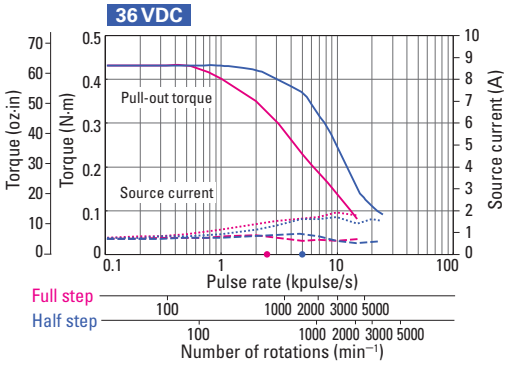
Characteristics diagram

With rubber coupling

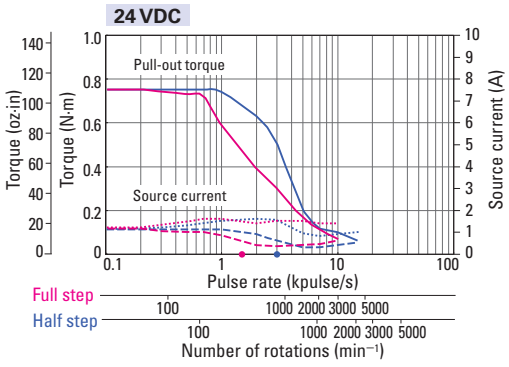
Pull-out torque Full step —— Half step ——
Source current (no load) Full step - - - Half step - - -
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

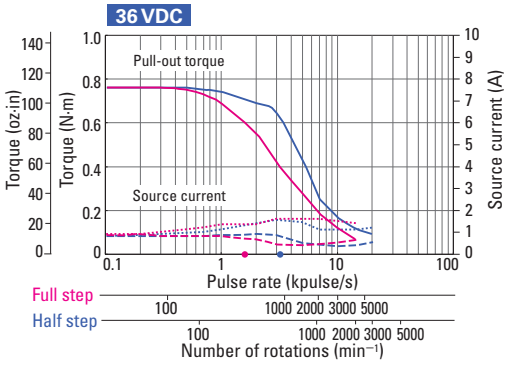
DU16H711S DU16H711D



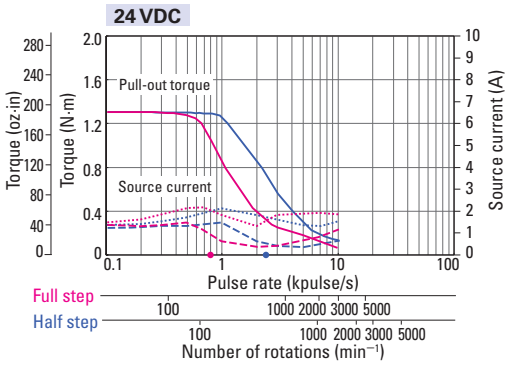


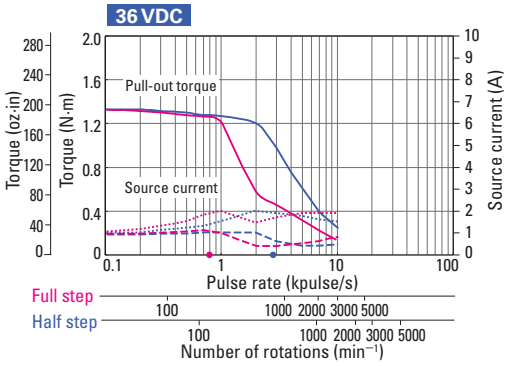
DU16H713S DU16H713D





DU16H716S DU16H716D





System Configuration Diagram ▶p. 30 Set Model Configuration ▶p. 32 Motor Dimensions ▶pp. 41 to 42 Driver Dimensions ▶p. 44

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Bipolar DC input driver (Model No.: BS1D200P10) + Motor

RoHS

Size			28 mm sq. (1.10 in sq.)/Basic step angle1.8°		42 mm sq. (1.65 in sq.)/Basic step angle1.8°	
	Motor size		32 mm (1.26 in)	51.5 mm (2.03 in)	33 mm (1.30 in)	39 mm (1.54 in)
Single shaft	Set model number		DB14S281S	DB14S285S	DB14H521S	DB14H522S
	Configuration item: motor number		SH2281-5771	SH2285-5771	103H5205-5240	103H5208-5240
Dual shaft	Set model number		DB14S281D	DB14S285D	DB14H521D	DB14H522D
	Configuration item: motor number		SH2281-5731	SH2285-5731	103H5205-5210	103H5208-5210
Holding torque		N·m (oz·in)	0.07 (9.91)	0.145 (20.53)	0.265 (37.53)	0.39 (55.23)
Rotor inertia		X 10^{-4}kg·m² (oz·in²)	0.01 (0.05)	0.022 (0.12)	0.036 (0.20)	0.056 (0.31)
Rated current		A/phase	1	1	1	1
Motor mass *1		kg (lbs)	0.11 (0.24)	0.2 (0.44)	0.23 (0.51)	0.29 (0.64)
Allowable thrust load		N (lbs)	3 (0.67)	3 (0.67)	10 (2.25)	10 (2.25)
Allowable radial load *2		N (lbs)	42 (9.44)	49 (9.44)	26 (5.85)	24 (5.4)

*1 Driver mass ▶p. 45 *2 The load point is at the tip of the output shaft.

Characteristics diagram

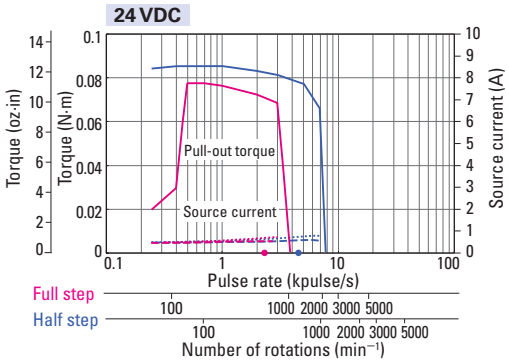
With rubber coupling

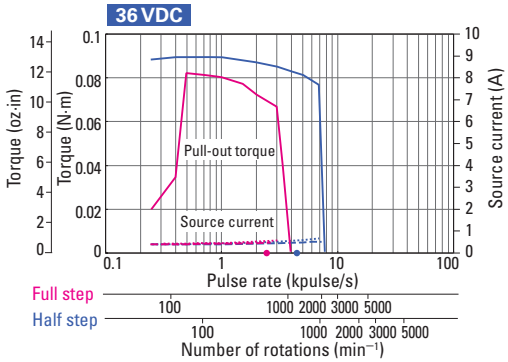
Pull-out torque Full step —— Half step —— Source current (no load) Full step - - - Half step - - -

fs : Maximum self-start frequency when not loaded Full step ● Half step ●

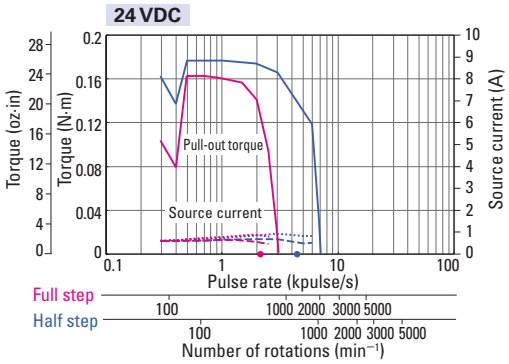
Source current (load applied) Full step ····· Half step ·····

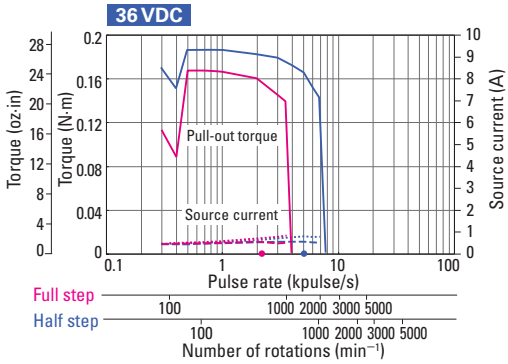
DB14S281S DB14S281D



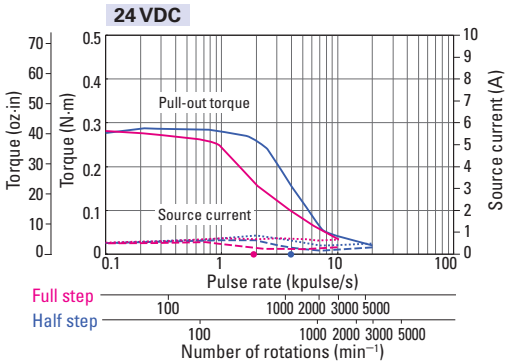


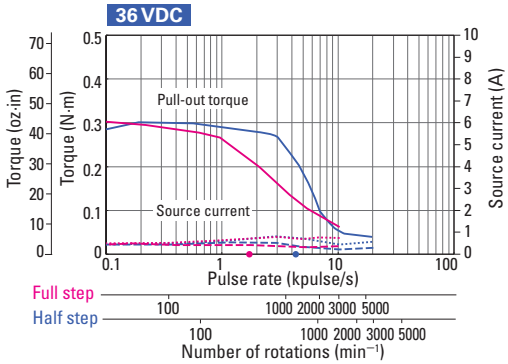
DB14S285S DB14S285D



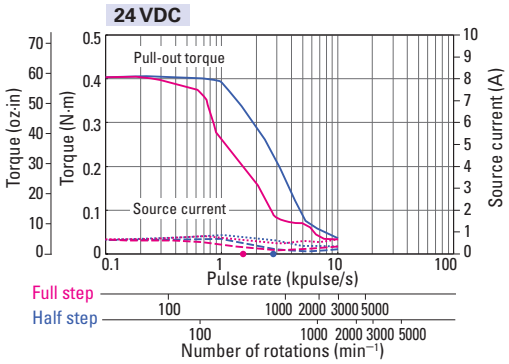


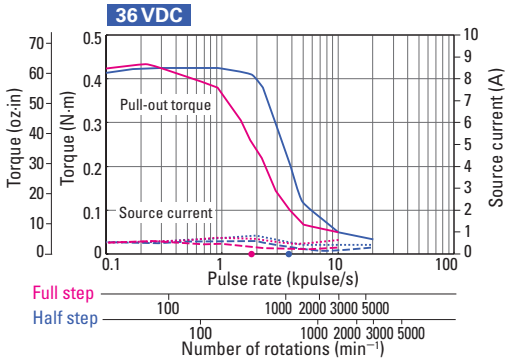
DB14H521S DB14H521D





DB14H522S DB14H522D





System Configuration Diagram▶p. 12 Set Model Configuration▶p. 32 Motor Dimensions▶pp. 41 to 42 Driver Dimensions▶p. 44

Bipolar DC input driver (Model No.: BS1D200P10) + Motor

RoHS

Size	Motor size	42 mm sq. (1.65 in sq.)/Basic step angle1.8°	42 mm sq. (1.65 in sq.)/Basic step angle 0.9°		
	Motor length	48 mm (1.89 in)	33 mm (1.30 in)	39 mm (1.54 in)	48 mm (1.89 in)
Single shaft	Set model number	DB14H524S	DB16S141S	DB16S142S	DB16S144S
	Configuration item: motor number	103H5210-5240	SH1421-5241	SH1422-5241	SH1424-5241
Dual shaft	Set model number	DB14H524D	DB16S141D	DB16S142D	DB16S144D
	Configuration item: motor number	103H5210-5210	SH1421-5211	SH1422-5211	SH1424-5211
Holding torque	N·m (oz·in)	0.51 (72.22)	0.23 (32.57)	0.34 (48.15)	0.48 (67.97)
Rotor inertia	X 10^{-4}kg·m² (oz·in²)	0.074 (0.40)	0.044 (0.24)	0.066 (0.361)	0.089 (0.487)
Rated current	A/phase	1	2	2	2
Motor mass *1	kg (lbs)	0.37 (0.82)	0.24 (0.53)	0.29 (0.64)	0.38 (0.84)
Allowable thrust load	N (lbs)	10 (2.25)	10 (2.25)	10 (2.25)	10 (2.25)
Allowable radial load *2	N (lbs)	21 (4.72)	25 (5.62)	24 (5.4)	20 (4.5)

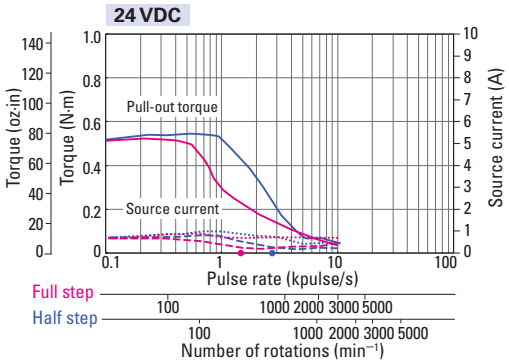
*1 Driver mass ▶p. 45 *2 The load point is at the tip of the output shaft.

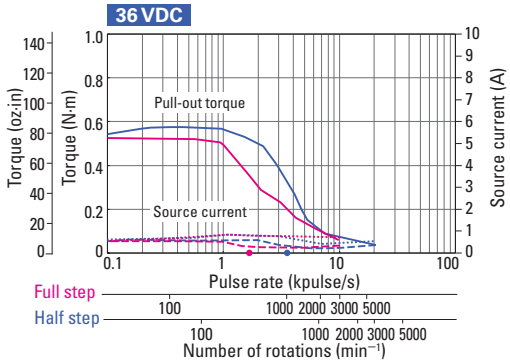
Characteristics diagram

With rubber coupling

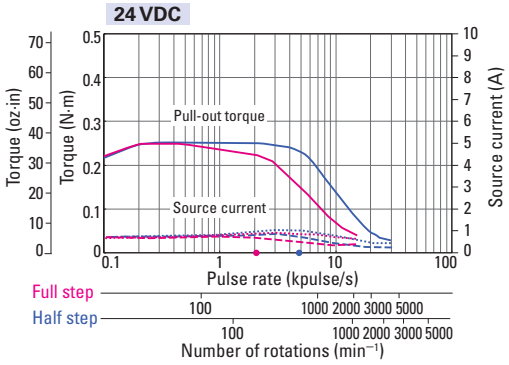
Pull-out torque Full step —— Half step ——
Source current (no load) Full step - - - Half step - - -
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

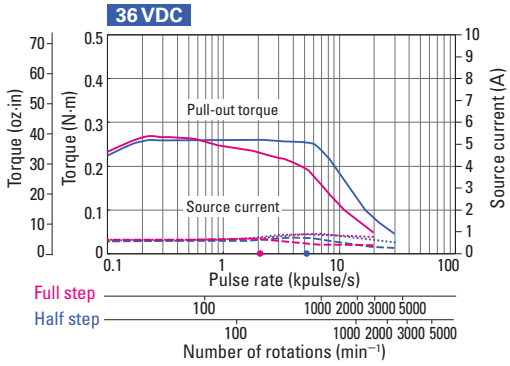
DB14H524S DB14H524D



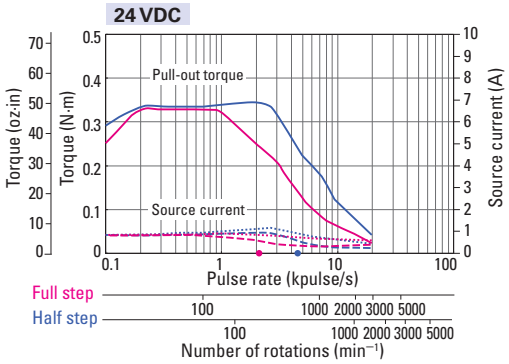


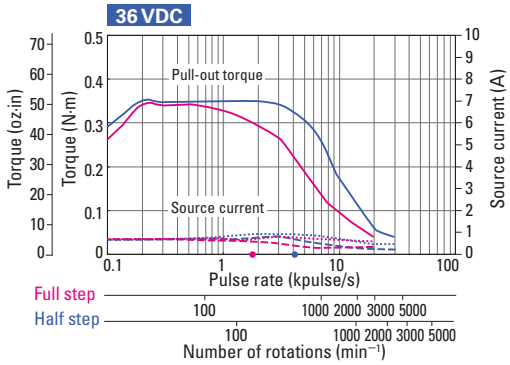
DB16S141S DB16S141D



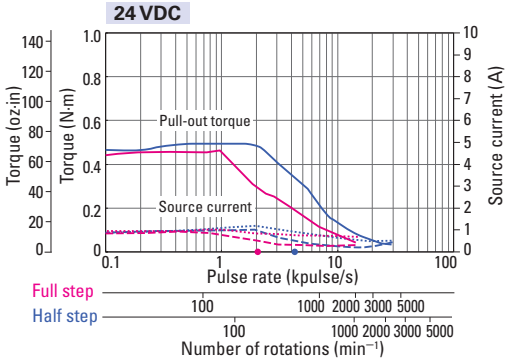


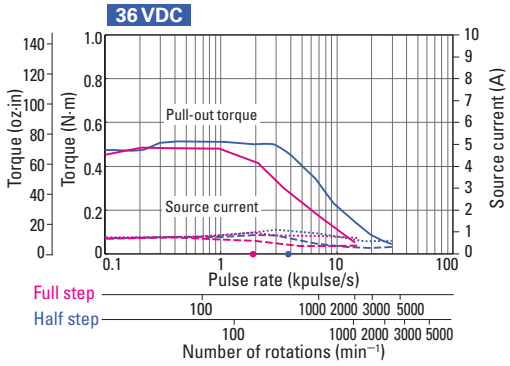
DB16S142S DB16S142D





DB16S144S DB16S144D





System Configuration Diagram▶p. 12 Set Model Configuration▶p. 32 Motor Dimensions▶pp. 41 to 42 Driver Dimensions▶p. 44

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Bipolar DC input driver (Model No.: BS1D200P10) + Motor

RoHS

Size			50 mm sq. (1.97 in sq.)/Basic step angle 1.8°		56 mm sq. (2.20 in sq.)/Basic step angle 1.8°	
	Motor length		39.8 mm (1.57 in)	51.3 mm (2.02 in)	41.8 mm (1.65 in)	53.8 mm (2.12 in)
Single shaft	Set model number		DB16H671S	DB16H673S	DB16H711S	DB16H713S
	Configuration item: motor number		103H6701-5040	103H6703-5040	103H7121-5740	103H7123-5740
Dual shaft	Set model number		DB16H671D	DB16H673D	DB16H711D	DB16H713D
	Configuration item: motor number		103H6701-5010	103H6703-5010	103H7121-5710	103H7123-5710
Holding torque		N·m (oz·in)	0.28 (39.6)	0.49 (69.4)	0.55 (77.9)	1.0 (141.6)
Rotor inertia		X 10^{-4}kg·m^2 (oz·in^2)	0.057 (0.31)	0.118 (0.65)	0.1 (0.55)	0.21 (1.15)
Rated current		A/phase	2	2	2	2
Motor mass *1		kg (lbs)	0.35 (0.77)	0.5 (1.10)	0.47 (1.04)	0.65 (1.43)
Allowable thrust load		N (lbs)	15 (3.37)	15 (3.37)	15 (3.37)	15 (3.37)
Allowable radial load *2		N (lbs)	79 (17.76)	75 (16.86)	70 (15.74)	56 (12.59)

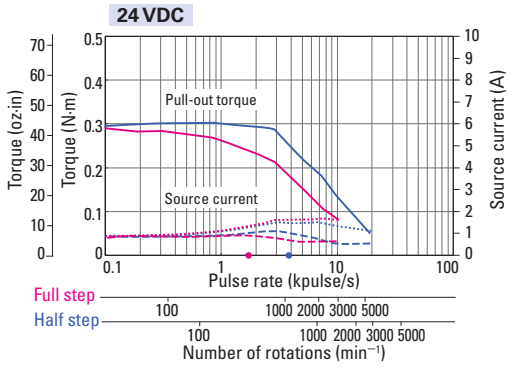
*1 Driver mass ▶p. 45 *2 The load point is at the tip of the output shaft.

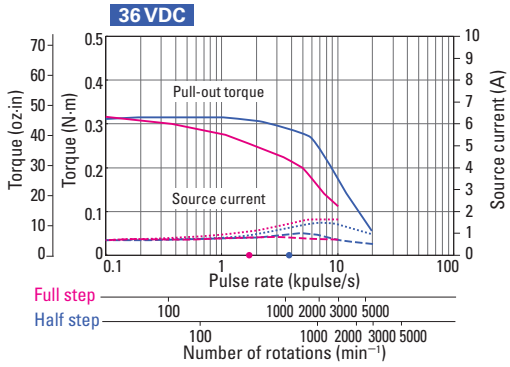
Characteristics diagram

With rubber coupling

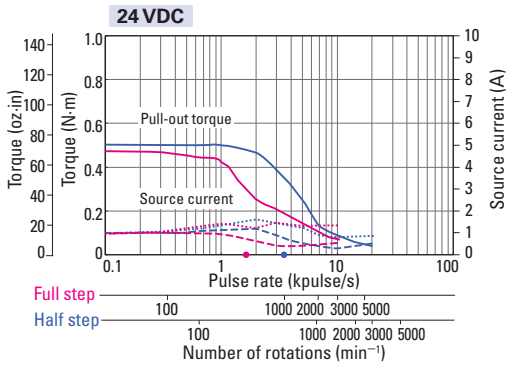
Pull-out torque Full step —— Half step ——
Source current (no load) Full step - - - Half step - - -
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

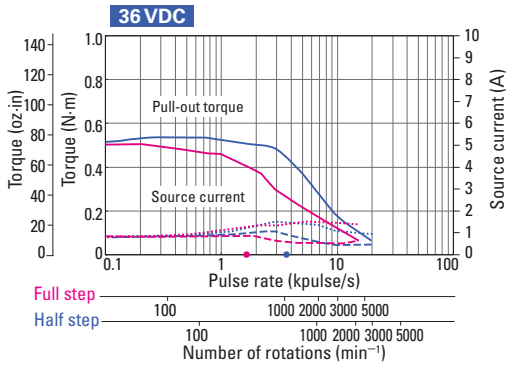
DB16H671S DB16H671D



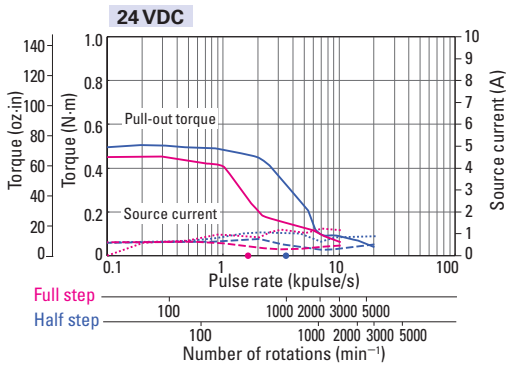


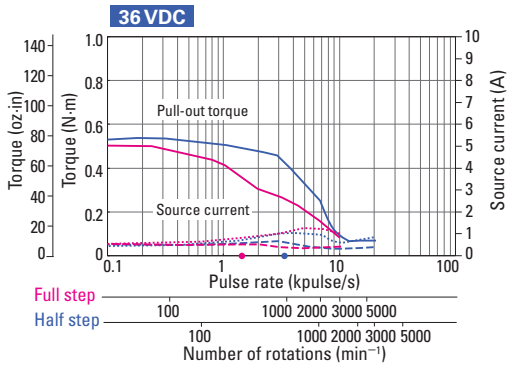
DB16H673S DB16H673D



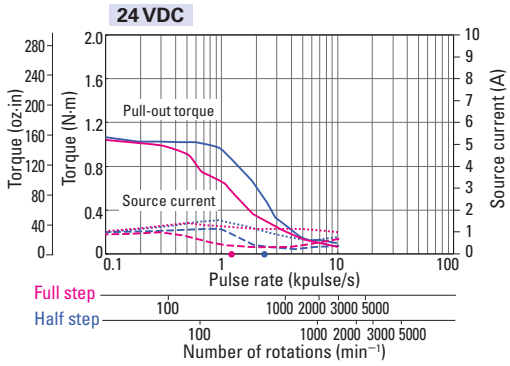


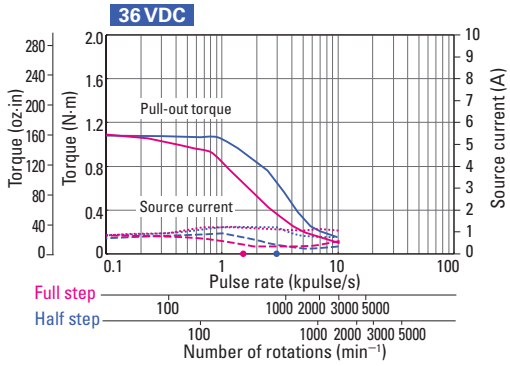
DB16H711S DB16H711D





DB16H713S DB16H713D





System Configuration Diagram▶p. 12 Set Model Configuration▶p. 32 Motor Dimensions▶pp. 41 to 42 Driver Dimensions▶p. 44

Bipolar DC input driver (Model No.: BS1D200P10) + Motor

RoHS

Size		56 mm sq. (2.20 in sq.)/Basic step angle 1.8°	60 mm sq. (2.36 in sq.)/Basic step angle 1.8°		
	Motor length	75.8 mm (2.98 in)	44.8 mm (1.76 in)	53.8 mm (2.12 in)	85.8 mm (3.38 in)
Single shaft	Set model number	DB16H716S	DB16H781S	DB16H782S	DB16H783S
	Configuration item: motor number	103H7126-5740	103H7821-5740	103H7822-5740	103H7823-5740
Dual shaft	Set model number	DB16H716D	DB16H781D	DB16H782D	DB16H783D
	Configuration item: motor number	103H7126-5710	103H7821-5710	103H7822-5710	103H7823-5710
Holding torque	N·m (oz·in)	1.6 (226.6)	0.88 (124.6)	1.37 (194.0)	2.7 (382.3)
Rotor inertia	X 10⁻⁴kg·m² (oz·in²)	0.36 (1.97)	0.275 (1.50)	0.4 (2.19)	0.84 (4.59)
Rated current	A/phase	2	2	2	2
Motor mass *1	kg (lbs)	0.98 (2.16)	0.6 (1.32)	0.77 (1.70)	1.34 (2.95)
Allowable thrust load	N (lbs)	15 (3.37)	15 (3.37)	15 (3.37)	15 (3.37)
Allowable radial load *2	N (lbs)	33 (7.42)	109 (24.5)	101 (22.71)	71 (15.96)

*1 Driver mass ▶p. 45 *2 The load point is at the tip of the output shaft.

Characteristics diagram

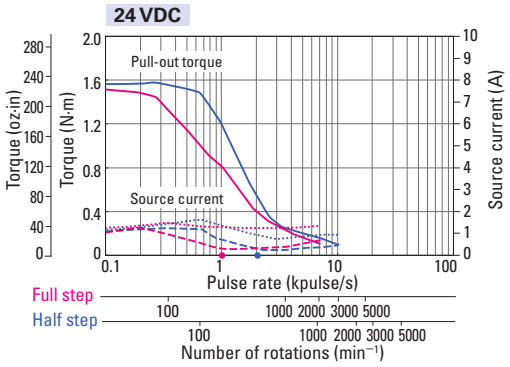
With rubber coupling

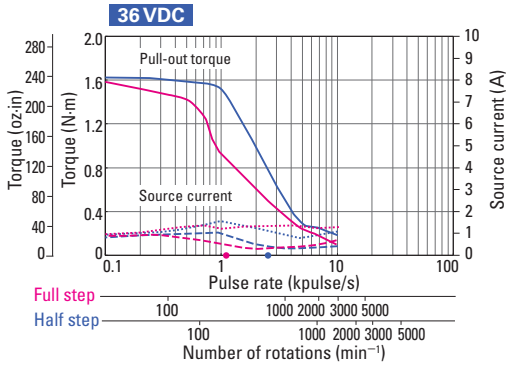
Pull-out torque Full step —— Half step —— Source current (no load) Full step - - - Half step - - -

fs : Maximum self-start frequency when not loaded Full step ● Half step ●

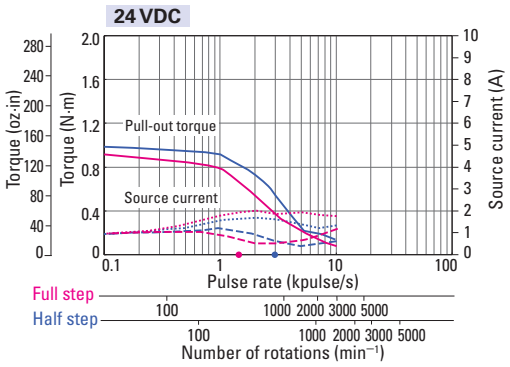
Source current (load applied) Full step ····· Half step ·····

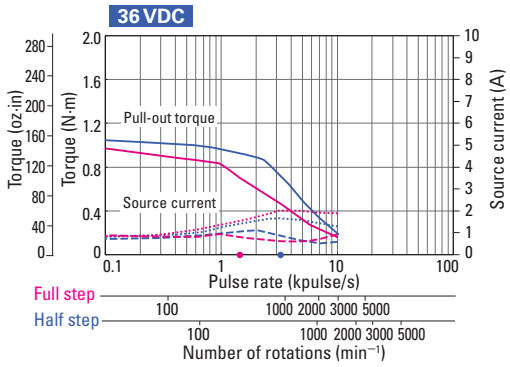
DB16H716S DB16H716D



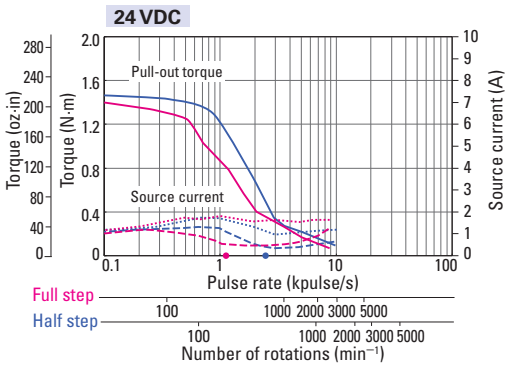


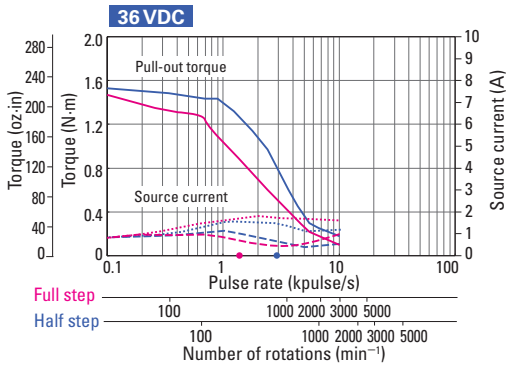
DB16H781S DB16H781D



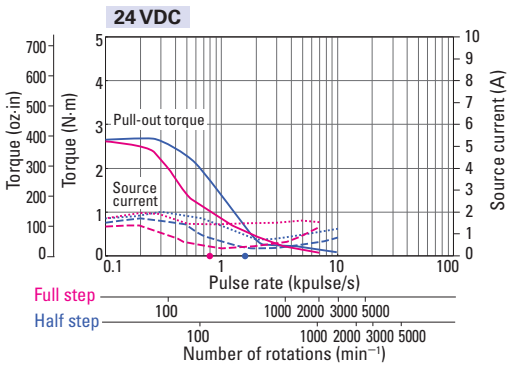


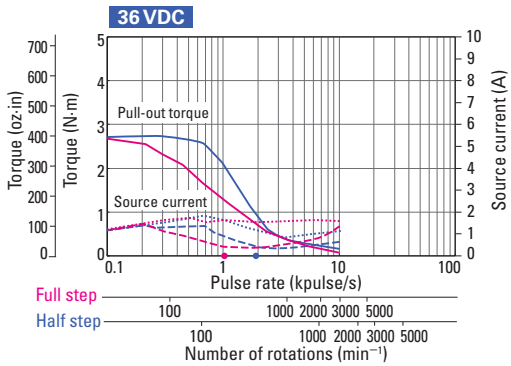
DB16H782S DB16H782D





DB16H783S DB16H783D





System Configuration Diagram▶p. 12 Set Model Configuration▶p. 32 Motor Dimensions▶pp. 41 to 42 Driver Dimensions▶p. 44

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Bipolar DC input driver (Model No.: BS1D200P10) + Motor

RoHS

Size	Motor size		60 mm sq. (2.36 in sq.)/Basic step angle 0.9°	
	Motor length		42 mm (16.54 in)	54 mm (21.26 in)
Single shaft	Set model number		DB16S161S	DB16S162S
	Configuration item: motor number		SH1601-5240	SH1602-5240
Dual shaft	Set model number		DB16S161D	DB16S162D
	Configuration item: motor number		SH1601-5210	SH1602-5210
Holding torque		N·m (oz·in)	0.69 (97.71)	1.28 (181.26)
Rotor inertia		X 10^{-4}kg·m² (oz·in²)	0.24 (1.312)	0.4 (2.187)
Rated current		A/phase	2	2
Motor mass *1		kg (lbs)	0.55 (1.21)	0.8 (1.76)
Allowable thrust load		N (lbs)	15 (3.37)	15 (3.37)
Allowable radial load *2		N (lbs)	78 (17.54)	65 (14.61)

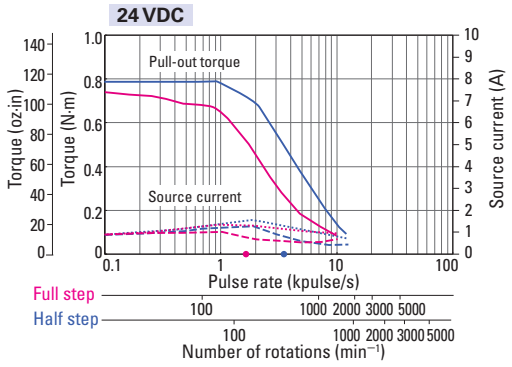
*1 Driver mass ▶p. 45 *2 The load point is at the tip of the output shaft.

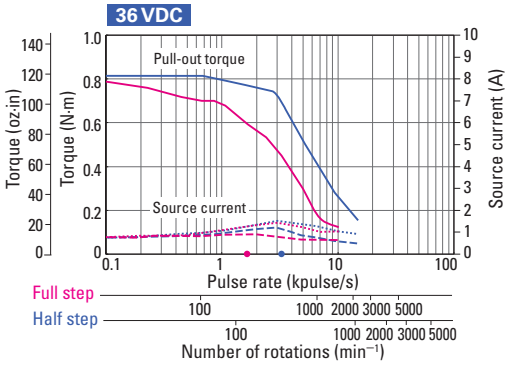
Characteristics diagram

With rubber coupling

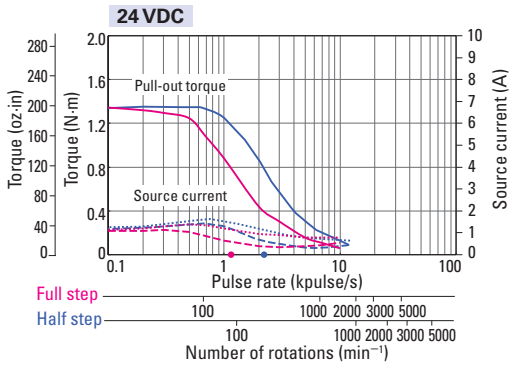
Pull-out torque Full step —— Half step ——
Source current (no load) Full step - - - Half step - - -
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

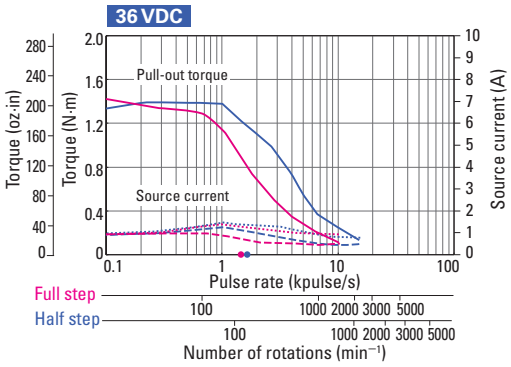
DB16S161S DB16S161D





DB16S162S DB16S162D

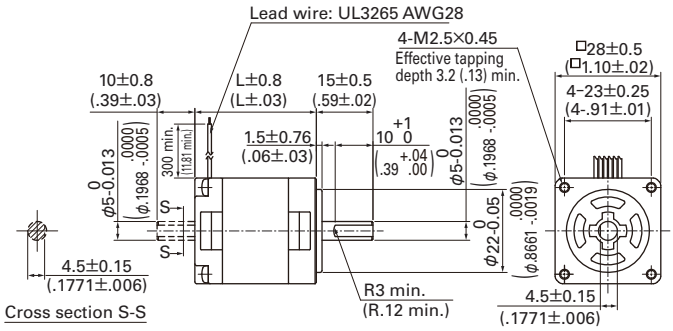




Stepping Motor: Dimensions

[Unit: mm (inch)]

28 mm sq. (1.10 inch sq.)



Note: A unipolar motor is illustrated; bipolar motors have four lead wires.

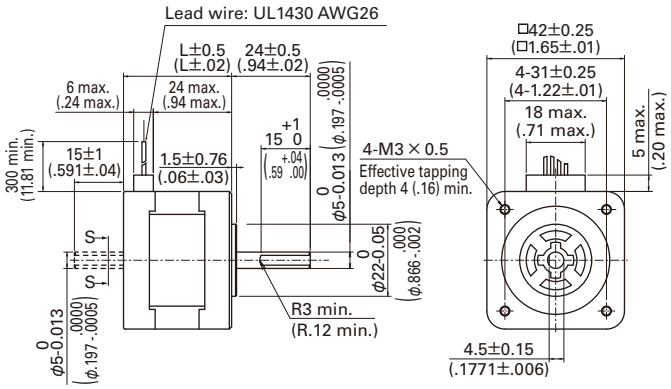
Unipolar

Set model number		Motor model number		Motor length (L)
Single shaft	Dual shaft	Single shaft	Dual shaft	
DU14S281S	DU14S281D	SH2281-5271	SH2281-5231	32 (1.26)
DU14S285S	DU14S285D	SH2285-5271	SH2285-5231	51.5 (2.03)

Bipolar

Set model number		Motor model number		Motor length (L)
Single shaft	Dual shaft	Single shaft	Dual shaft	
DB14S281S	DB14S281D	SH2281-5771	SH2281-5731	32 (1.26)
DB14S285S	DB14S285D	SH2285-5771	SH2285-5731	51.5 (2.03)

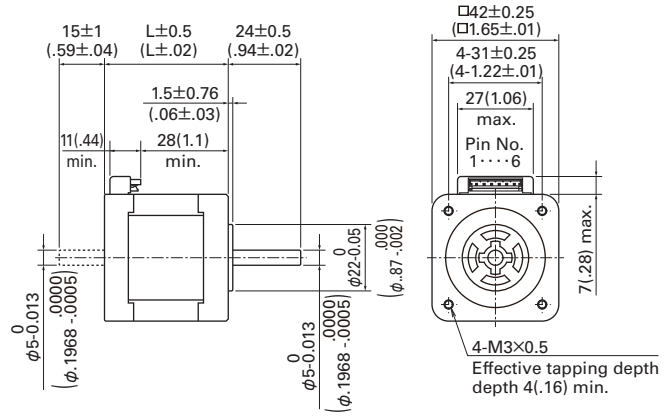
42 mm sq. (1.65 inch sq.)



Bipolar

Set model number		Motor model number		Motor length (L)
Single shaft	Dual shaft	Single shaft	Dual shaft	
DB14H521S	DB14H521D	103H5205-5240	103H5205-5210	33 (1.25)
DB14H522S	DB14H522D	103H5208-5240	103H5208-5210	39 (1.54)
DB14H524S	DB14H524D	103H5210-5240	103H5210-5210	48 (1.89)

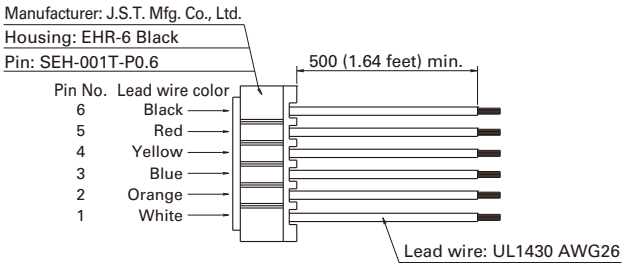
42 mm sq. (1.65 inch sq.)



Unipolar

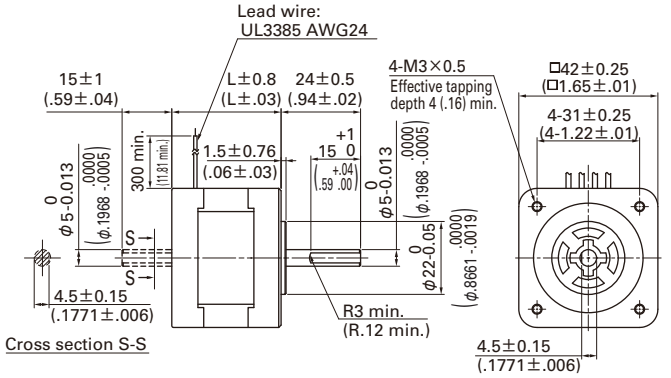
Set model number		Motor model number		Motor length (L)
Single shaft	Dual shaft	Single shaft	Dual shaft	
DU15H521S	DU15H521D	103H5205-0440	103H5205-0410	33 (1.25)
DU15H522S	DU15H522D	103H5208-0440	103H5208-0410	39 (1.54)
DU15H524S	DU15H524D	103H5210-0440	103H5210-0410	48 (1.89)

Motor cable Model number: 4835710-1



This driver-motor cable is for motor model numbers 103H52□□-04□□.

42 mm sq. (1.65 inch sq.)



Note: A bipolar motor is illustrated; unipolar motors have six lead wires.

Unipolar

Set model number		Motor model number		Motor length (L)
Single shaft	Dual shaft	Single shaft	Dual shaft	
DU15S141S	DU15S141D	SH1421-0441	SH1421-0411	33 (1.25)
DU15S142S	DU15S142D	SH1422-0441	SH1422-0411	39 (1.54)
DU15S144S	DU15S144D	SH1424-0441	SH1424-0411	48 (1.89)

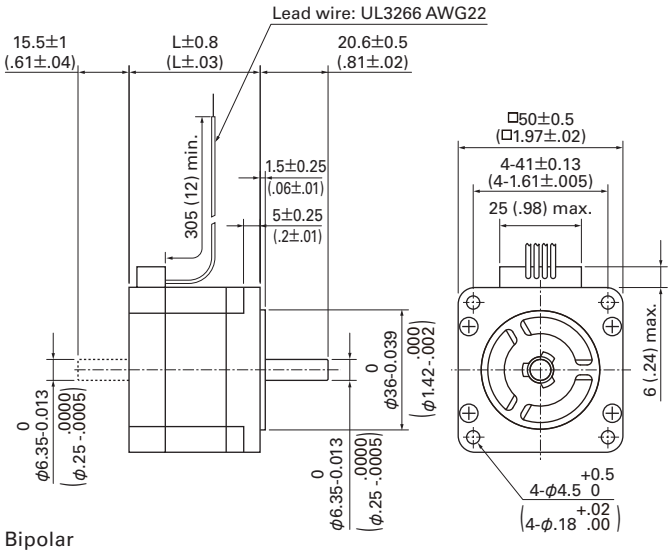
Bipolar

Set model number		Motor model number		Motor length (L)
Single shaft	Dual shaft	Single shaft	Dual shaft	
DB16S141S	DB16S141D	SH1421-5241	SH1421-5211	33 (1.25)
DB16S142S	DB16S142D	SH1422-5241	SH1422-5211	39 (1.54)
DB16S144S	DB16S144D	SH1424-5241	SH1424-5211	48 (1.89)

Stepping Motor: Dimensions

[Unit: mm (inch)]

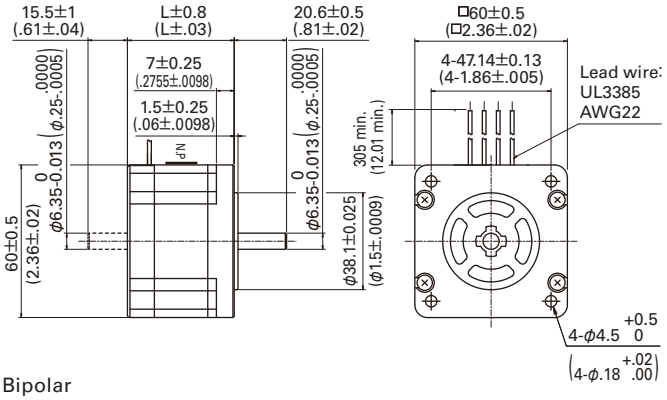
50 mm sq. (1.97 inch sq.)



Bipolar

Set model number		Motor model number		Motor length (L)
Single shaft	Dual shaft	Single shaft	Dual shaft	
DB16H671S	DB16H671D	103H6701-5040	103H6701-5010	39.8 (1.57)
DB16H673S	DB16H673D	103H6703-5040	103H6703-5010	51.3 (2.02)

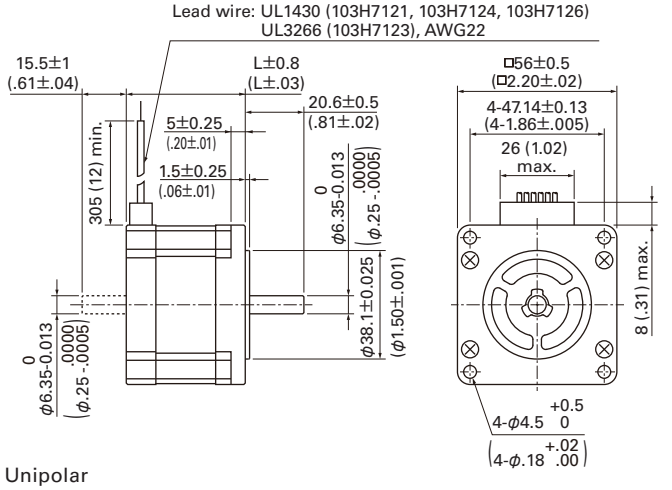
60 mm sq. (2.36 inch sq.)



Bipolar

Set model number		Motor model number		Motor length (L)
Single shaft	Dual shaft	Single shaft	Dual shaft	
DB16S161S	DB16S161D	SH1601-5240	SH1601-5210	42 (1.65)
DB16S162S	DB16S162D	SH1602-5240	SH1602-5210	54 (2.13)

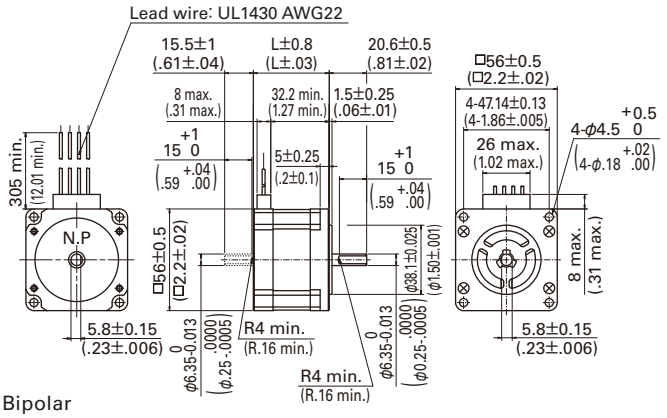
56 mm sq. (2.20 inch sq.)



Unipolar

Set model number		Motor model number		Motor length (L)
Single shaft	Dual shaft	Single shaft	Dual shaft	
DU16H711S	DU16H711D	103H7121-0440	103H7121-0410	41.8 (1.65)
DU16H713S	DU16H713D	103H7123-0440	103H7123-0410	53.8 (2.12)
DU16H716S	DU16H716D	103H7126-0440	103H7126-0410	75.8 (2.98)

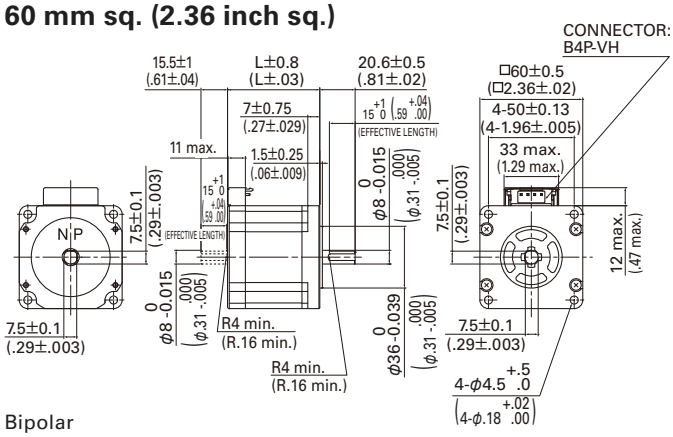
56 mm sq. (2.20 inch sq.)



Bipolar

Set model number		Motor model number		Motor length (L)
Single shaft	Dual shaft	Single shaft	Dual shaft	
DB16H711S	DB16H711D	103H7121-5740	103H7121-5710	41.8 (1.65)
DB16H713S	DB16H713D	103H7123-5740	103H7123-5710	53.8 (2.12)
DB16H716S	DB16H716D	103H7126-5740	103H7126-5710	75.8 (2.98)

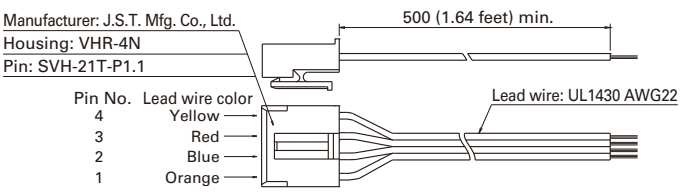
60 mm sq. (2.36 inch sq.)



Bipolar

Set model number		Motor model number		Motor length (L)
Single shaft	Dual shaft	Single shaft	Dual shaft	
DB16H781S	DB16H781D	103H7821-5740	103H7821-5710	44.8 (1.76)
DB16H782S	DB16H782D	103H7822-5740	103H7822-5710	53.8 (2.12)
DB16H783S	DB16H783D	103H7823-5740	103H7823-5710	85.8 (3.38)

Motor cable Bipolar Model number: 4837961-1



Stepping Motor: General Specifications

Motor model number	SH228 □	SH142 □	103H52 □□	103H67 □□	103H712 □	SH160 □	103H78 □□
Type	—						
Operating ambient temperature	− 10℃ to + 50℃						
Conversation temperature	− 20℃ to + 65℃						
Operating ambient humidity	20 to 90% RH (no condensation)						
Conversation humidity	5 to 95% RH (no condensation)						
Operation altitude	1000 m (3281 feet) max. above sea level						
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 150 m/s² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.						
Impact resistance	500 m/s² of acceleration for 11 ms with half-sine wave applying three times for X, Y, and Z axes each, 18 times in total.						
Insulation class	Class B (+130℃)						
Withstandable voltage	At normal temperature and humidity, no failure with 500 VAC @50/60 Hz applied for one minute between motor winding and frame.			At normal temperature and humidity, no failure with 1000 VAC @50/60 Hz applied for one minute between motor winding and frame.			
Insulation resistance	At normal temperature and humidity, not less then 100 MΩ between winding and frame by 500 VDC megger.						
Protection grade	IP40						
Winding temperature rise	80 K max. (Based on Sanyo Denki standard)						
Static angle error	± 0.09°	± 0.054°	± 0.09°			± 0.054°	± 0.09°
Thrust play *1	0.075 mm (0.003 in) max. (load: 1.5 N (0.34 lbs))	0.075 mm (0.003 in) max. (load: 5 N (1.12 lbs))	0.075 mm (0.003 in) (load: 5 N (1.12 lbs))	0.075 mm (0.003 in) (load: 10 N (2.25 lbs))	0.075 mm (0.003 in) (load: 10 N (2.25 lbs))	0.075 mm (0.003 in) (load: 10 N (2.25 lbs))	0.075 mm (0.003 in) (load: 10 N (2.25 lbs))
Radial play *2	0.025 mm (0.001 in) max. (load: 5 N (1.12 lbs))						
Shaft runout	0.025 mm (0.001 in)						
Concentricity of mounting pilot relative to shaft	φ 0.05 mm (φ 0.002 in)	φ 0.05 mm (φ 0.002 in)	φ 0.05 mm (φ 0.002 in)	φ 0.075 mm (φ 0.003 in)	φ 0.075 mm (φ 0.003 in)	φ 0.075 mm (φ 0.003 in)	φ 0.075 mm (φ 0.003 in)
Squareness of mounting surface relative to shaft	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.075 mm (0.003 in)	0.075 mm (0.003 in)	0.1 mm (0.004 in)	0.075 mm (0.003 in)
Direction of motor mounting	Can be freely mounted vertically or horizontally						

*1 Thrust play: Shaft displacement under axial load.
*2 Radial play: Shaft displacement under radial load applied one-third of the length from the end of the shaft.

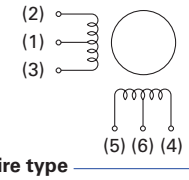
Internal Wiring and Rotation Direction

Unipolar winding

Connector type Model number: 103H52 □□

Internal wire connection

( ) connector pin number



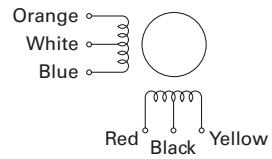
Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

		Connector pin number				
		(1.6)	(5)	(3)	(4)	(2)
Exciting order	1	+	−	−		
	2	+		−	−	
	3	+			−	−
	4	+	−			−

Lead wire type

Internal wire connection



Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

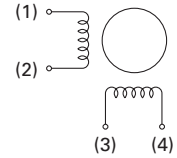
		Lead wire color				
		White & black	Red	Blue	Yellow	Orange
Exciting order	1	+	−	−		
	2	+		−	−	
	3	+			−	−
	4	+	−			−

Bipolar winding

Connector type

Internal wire connection

( ) connector pin number, terminal block number



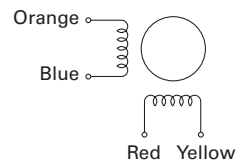
Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

		Connector pin number, terminal block number			
		(3)	(2)	(4)	(1)
Exciting order	1	−	−	+	+
	2	+	−	−	+
	3	+	+	−	−
	4	−	+	+	−

Lead wire type

Internal wire connection

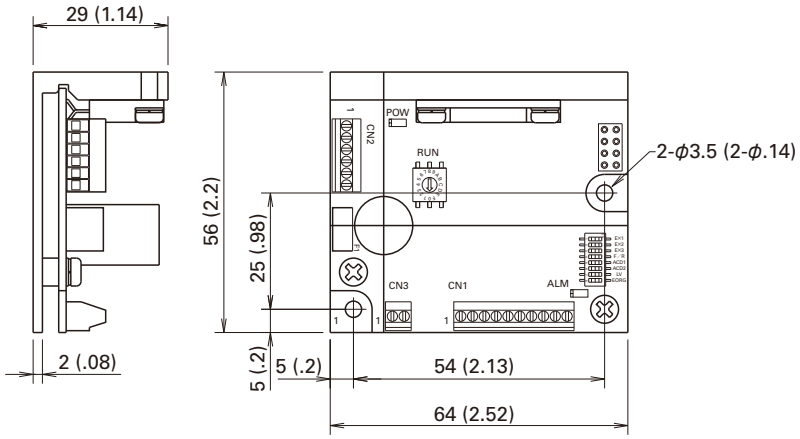


Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

		Lead wire color			
		Red	Blue	Yellow	Orange
Exciting order	1	−	−	+	+
	2	+	−	−	+
	3	+	+	−	−
	4	−	+	+	−

Driver Dimensions [Unit: mm (inch)]



Driver Specifications

General specifications

			Unipolar	Bipolar
Basic specifications	Model number		**US1D200P10**	**BS1D200P10**
	Input source		24/36 VDC ± 10%	
	Source current		3 A	
	Environment	Protection class	Class Ⅲ	
		Operation environment	Installation category (over-voltage category) : Ⅰ, pollution degree: 2	
		Ambient operation temperature	0 to + 50℃	
		Conservation temperature	− 20 to + 70℃	
		Operating ambient humidity	35 to 85% RH (no condensation)	
		Conservation humidity	10 to 90% RH (no condensation)	
		Operation altitude	1000 m (3281 feet) or less above sea level	
		Vibration resistance	Tested under the following conditions: 5 m/s² frequency range 10 to 55 Hz, direction along X, Y and Z axes, for 2 hours each	
		Impact resistance	Not influenced at NDS-C-0110 standard section 3.2.2 division "C".	
		Withstandable voltage	Not influenced when 0.5 kVAC is applied between power input terminal and cabinet for one minute.	
		Insulation resistance	10 MΩ min. when measured with 500 VDC megohmmeter between input terminal and cabinet.	
	Mass (Weight)		0.09 kg (0.20 lbs)	
Functions	Selection functions		Step angle, pulse input mode, low vibration mode, step current, operating current, original excitation phase	
	Protection functions		Open phase protection, Main circuit power source voltage decrease	
	LED indication		Power monitor, alarm display	
I/O signals	Command pulse input signal		Photocoupler input system, input resistance: 220 Ω input-signal "H" level: 4.0 to 5.5 V, input-signal "L" level: 0 to 0.5 V Maximum input frequency: 150 kpulse/s	
	Power down input signal		Photocoupler input system, input resistance: 220 Ω input-signal "H" level: 4.0 to 5.5V, input-signal "L" level: 0 to 0.5 V	
	Phase origin monitor output signal		From the photocoupler by the open collector output Output specification: Vceo = 40 V max., Ic = 10 mA max.	
	Rotation monitor output signal		From the photocoupler by the open collector output Output specification: Vceo = 40 V max., Ic = 10 mA max.	

Safety standards

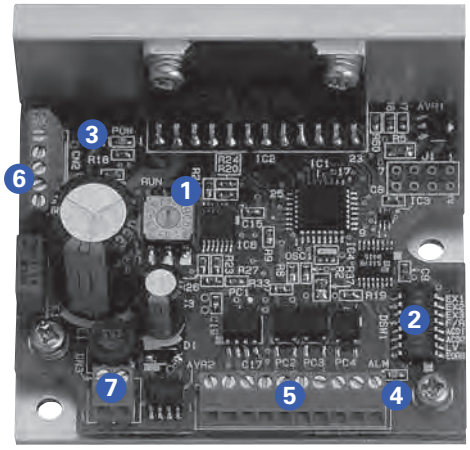
	Directives	Category	Standard	Name
CE (TÜV)	Low-voltage directives	−	EN61010-1	−
	EMC directives	Emission	EN55011-A	Terminal disturbance voltage
			EN55011-A	Electromagnetic radiation disturbance
		Immunity	EN61000-4-2	ESD (Electrostatic discharge)
			EN61000-4-3	RS (Radio-frequency amplitude modulated electromagnetic field)
			EN61000-4-4	Fast transients/burst
			EN61000-4-6	Conducted disturbances
UL	Acquired standards		Applicable standard	File No.
	UL		UL508C	E179775
	UL for Canada			

・EMC characteristics may vary depending on the configuration of the users' control panel, which contains the driver or stepping motor, or the arrangement and wiring of other electrical devices.
Parts for EMC noise suppression like noise filters and toroidal type ferrite cores may be required depending on circumstances.
・Validation test of driver has been performed for low-voltage EMC directives at TÜV (TÜV product service) for self-declaration of CE marking.

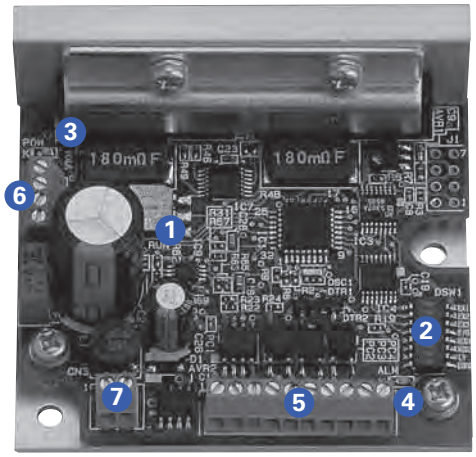
・Drivers are available for separate purchase. Connector-type drivers are also available. Contact us for details.

Driver Controls and Connectors

Unipolar



Bipolar



1 Operating current selection switch (RUN)

The value of the motor current can be set when operating.

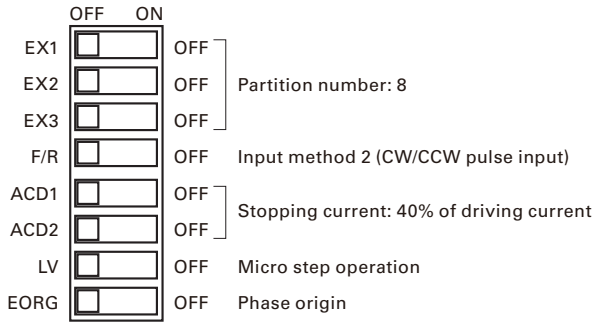
Dial	0	1	2	3	4	5	6	7
Stepping motor current (A)	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3
Dial	8	9	A	B	C	D	E	F
Stepping motor current (A)	1.2	1.1	1.0	0.9	0.8	0.7	0.6	0.5

- The factory setting is F (0.5 A).
  Select the current after checking the rated current of the combination motor.

2 Function selection DIP switchpack

Select the function depending on your specification.

Factory settings



1. Step angle select (EX1, EX2, EX3)

Select the partition number of the basic step angle.

EX1	EX2	EX3	Partition number
ON	ON	ON	1-division
OFF	ON	OFF	2-division
ON	OFF	OFF	4-division
OFF	OFF	OFF	8-division
OFF	OFF	ON	16-division

2. Input method select (F/R)

Select input pulse type.

F/R	Input pulse type
ON	1 input (CK, U/D)
OFF	2 input (CW, CCW)

3. Current selection when stopping (ACD1, ACD2)

Select the current value of the motor when stopping.

ACD2	ACD1	Current value of the motor
ON	ON	100% of driving current
ON	OFF	60% of driving current
OFF	ON	50% of driving current
OFF	OFF	40% of driving current

- Initial configuration of factory shipment is set to 40% of rated value. Driver and motor should be operated at around 50% of rated value to reduce heat.

4. Low-vibration mode select (LV)

Provides low-vibration, smooth operation even if resolution is coarse (1-division, 2-division, etc).

LV	Operation
ON	Auto-micro function
OFF	Micro-step

5. Excitation select (EORG)

The excitation phase when the power supply is engaged is selected.

EORG	Original excitation phase
ON	Excitation phase at power shut off
OFF	Phase origin

- By turning on the EORG, the excitation phase during power OFF will be saved. Therefore, there will be no shaft displacement when turning the power ON.

3 LED for power supply monitor (POW)

Lit up when the main circuit power supply is connected.

4 LED for alarm display (ALM)

Lights in the following conditions:

- Motor cable is broken.
- Switching element in driver is faulty.
- The main circuit voltage is out of specifications range (19 VDC max.).

When "ALM" is displayed, the winding current of the stepping motor is cut off and it is in a "non-excitation" state. At the same time, an output signal (photocoupler ON) is transmitted from the alarm output terminal (AL) to an external source. When the alarm circuit is operating, this state is maintained until it is reset by switching on the power supply again. When an alarm condition has occurred, please take corrective actions to rectify the cause of the alarm before switching on the power supply again.

5 I/O signal terminal block (CN1)

Connect the I/O signal.

6 Motor terminal block (CN2)

Connect the motor's power line.

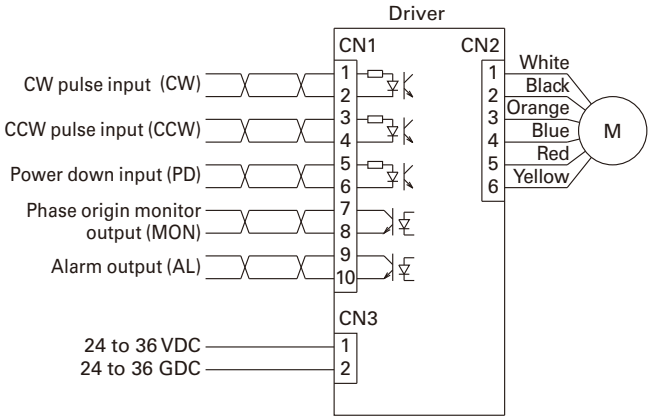
7 Power supply terminal block (CN3)

Connect the main circuit power supply.

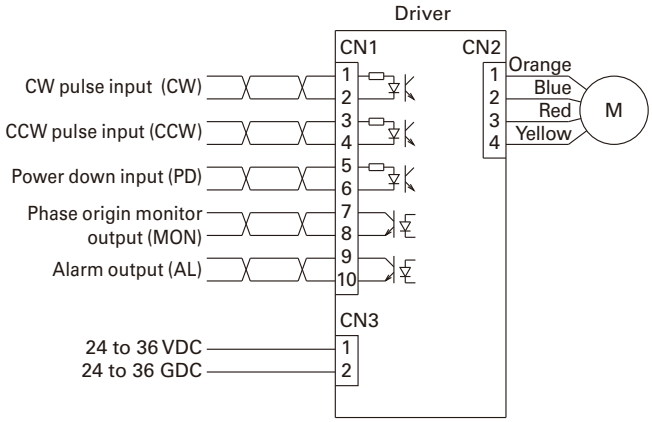
Connections and Signals

External wiring diagram

Unipolar



Bipolar



Applicable wire sizes

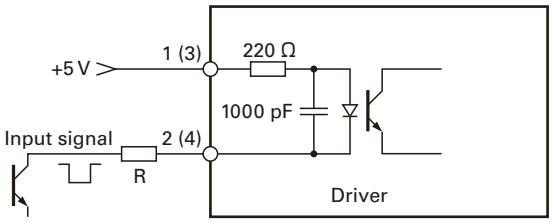
Part	Wire sizes	Allowable wire length
For power supply	AWG22 (0.3 mm²)	2 m max.
For input/output signal	AWG24 (0.2 mm²) to AWG22 (0.3 mm²)	2 m max.
For motor	AWG22 (0.3 mm²)	Under 3 m

Specification summary of input/output signals

Signal	CN1 Pin number	Function summary
CW pulse input (CW) (Standard)	1 2	When in "2 input mode", input the drive pulse that rotates in a CW direction.
Pulse train input (CK)	1 2	When in "1 input mode", input the drive pulse train for motor rotation.
CCW pulse input (CCW) (Standard)	3 4	When in "2 input mode", input the drive pulse train that rotates in a CCW direction.
Rotational direction input (U/D)	3 4	When "1 input mode", input the motor rotational direction signal. Internal photocoupler ON ··· CW direction Internal photocoupler OFF ··· CCW direction
Power down input (PD)	5 6	Inputting PD signal will cut off (power off) the current flowing to the motor (With DIP switch select, change to the Power low function is possible). PD input signal on (internal photocoupler on) ··· PD function is valid. PD input signal off (internal photocoupler off) ··· PD function is invalid.
Phase origin monitor output (MON)	7 8	When the excitation phase is at the origin (during power on) this function turns on. When FULL step, ON once for 4 pulses; when HALF step, ON once for 8 pulses.
Alarm output (AL)	9 10	When alarm circuits are actuated inside the driver, outputs signals to outside, after which the stepping motor changes to unexcited status.

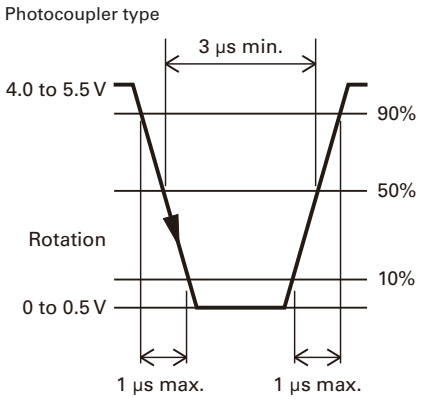
· As for the motor rotational direction, CW direction is regarded as the clockwise rotation, and CCW direction is regarded as the counterclockwise rotation by viewing the motor from output shaft side.

Circuit Configuration of Pulse Input CW (CK), CCW (U/D)



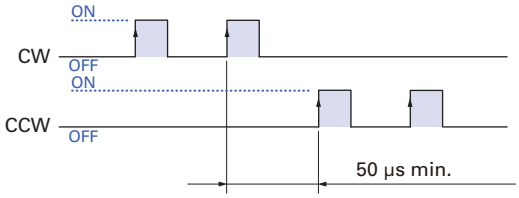
- Pulse duty 50% max.
- Maximum input frequency: 150 kpulse/s
- When the crest value of the input signal exceeds 5 V, use the external limit resistance R to limit the input current to approximately 15 mA.

Input signal specifications



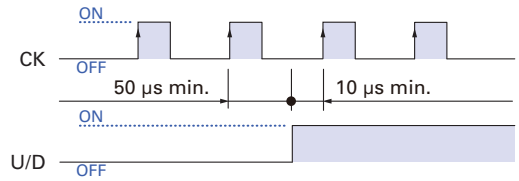
Timing of the command pulse

2 input mode (CW, CCW)



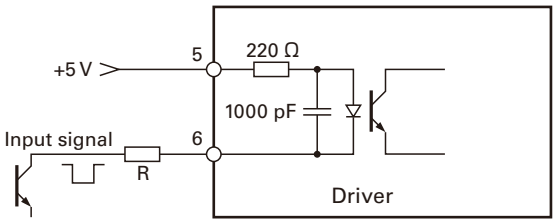
- Shaded area indicates internal photocoupler ON. Internal circuit (motor) starts operating at leading edge of the photocoupler ON.
- To apply pulse to CW, set CCW side internal photocoupler to OFF.
- To apply pulse to CCW, set CW side internal photocoupler to OFF.

1 input mode (CK, U/D)



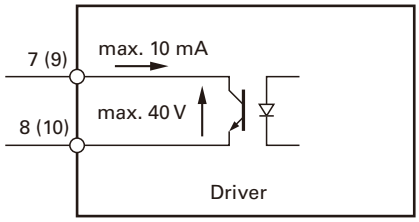
- Shaded area indicates internal photocoupler ON. Internal circuit (motor) starts operating at leading edge of CK side photocoupler ON.
- Switching of U/D input signal must be done while CK side internal photocoupler is OFF.

Input Circuit Configuration of Power Down Input (PD)

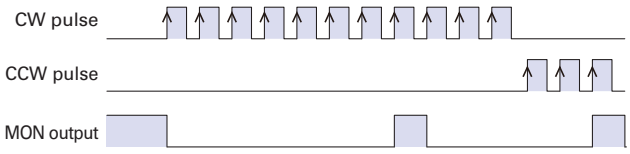


- When the crest value of the input signal exceeds 5 V, use the external limit resistance R to limit the input current to approximately 15 mA.

Output Signal Configuration of Phase Origin Monitor Output (MON) and Alarm Output (AL)



MON output



- Photocoupler is set to ON at phase origin of motor excitation (setting when number of divisions is 2).
- MON output is taken at every 7.2 degrees of motor output shaft from phase origin.

Stepping Motors

Stepping Motors ▶p. 54–

IP65 Splash and Dust Proof Stepping Motors Waterproof, dustproof ▶p. 89–

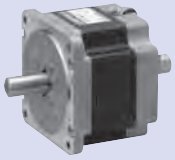
Stepping Motors for Vacuum Environments Customized Products ▶p. 93

Synchronous Motors Customized Products ▶p. 93

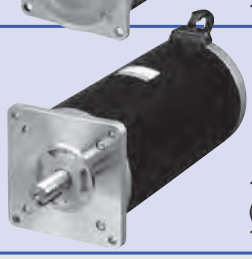
Lineup

Stepping Motors RoHS

These motors can be purchased as separate units.

Basic step angle	Motor size		Holding torque N·m (oz·in) Model number	Customizing*	Page
1.8°	14 mm sq. (0.55 inch sq.) Ultra-compact		0.0065 (0.92) SH2141-55□1	Hollow Shaft modification	p. 54
	28 mm sq. (1.10 inch sq.)		0.055 to 0.145 (7.79 to 20.53) SH228□-5□□1	Hollow Shaft modification Decelerator Encoder	pp. 55 to 56
	35 mm sq. (1.38 inch sq.)		0.12 to 0.23 (16.99 to 32.57) SH35□□-12U□0	Hollow Shaft modification	p. 57
0.9°	42 mm sq. (1.65 inch sq.)		0.2 to 0.48 (28.32 to 67.9) SH142□-□□□1	Hollow Shaft modification Decelerator Encoder	pp. 58 to 59
1.8°	42 mm sq. (1.65 inch sq.) Slim form		0.083 to 0.186 (11.75 to 26.33) SS242□-50□1	Hollow Shaft modification	p. 60
	42 mm sq. (1.65 inch sq.)		0.2 to 0.51 (28.32 to 72.22) 103H52□□-□□□0	Hollow Shaft modification Decelerator Encoder Brake	pp. 61 to 63
	50 mm sq. (1.97 inch sq.)		0.28 to 0.53 (39.6 to 75.1) 103H670□-□□□0	Hollow Shaft modification	pp. 64 to 66
	50 mm sq. (1.97 inch sq.) Slim form		0.1 to 0.215 (14.16 to 30.44) SS250□-80□0	Hollow Shaft modification	p. 67
	56 mm sq. (2.20 inch sq.)		0.39 to 2.0 (55.2 to 283.2) 103H712□-□□□0	Hollow Shaft modification Decelerator Encoder	pp. 68 to 71
0.9°	60 mm sq. (2.36 inch sq.)		0.57 to 2.15 (80.71 to 304.4) SH160□-□□□0	Hollow Shaft modification Decelerator Encoder	pp. 72 to 73
1.8°	60 mm sq. (2.36 inch sq.)		0.78 to 2.7 (110.5 to 382.3) 103H782□-□□□0	Hollow Shaft modification Decelerator Encoder Brake	pp. 74 to 77
	86 mm sq. (3.39 inch sq.) (CE and UL models are available.)		2.5 to 9 (354 to 1274.4) S□286□-□□□□	Hollow Shaft modification Encoder	pp. 78 to 82

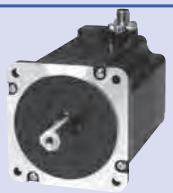
*Specifications can be customized, depending on the model number and quantity. Contact us for details.

Basic step angle	Motor size	Holding torque N·m (oz·in) Model number	Customizing*	Page
1.8°	ϕ106 mm (ϕ4.17 inch) 	10.8 to 19 (1529.4 to 2690.5) 103H8922□-□□□1	Hollow Shaft modification Brake	p. 83
	56 mm sq. (2.20 inch sq.) CE Model 	0.39 to 1.27 (55.2 to 179.8) 103H712□-6□□0	Hollow Shaft modification	p. 84
	ϕ86 mm (ϕ3.39 inch) CE Model 	2.74 to 7.44 (388 to 1053.6) 103H822□-63□0	Hollow Shaft modification	p. 85
	ϕ106 mm (ϕ4.17 inch) CE Model 	13.2 to 19 (1869.2 to 2690.5) 103H8922□-63□1	Hollow Shaft modification	p. 86

*Specifications can be customized, depending on the model number and quantity. Contact us for details.

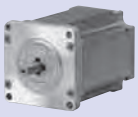
IP65 Splash and Dust Proof Stepping Motors

Waterproof, dustproof RoHS

Basic step angle	Motor size		Page
1.8°	56 mm sq. (2.20 inch sq.) CE/UL Model 	1 to 1.7 N·m (141.6 to 240.7 oz·in) SP256□-5□□0	p. 90
	86 mm sq. (3.39 inch sq.) CE/UL Model 	6.5 to 9 N·m (906.3 to 1274.5 oz·in) SP286□-5□□0	p. 91

Stepping Motors for Vacuum Environments

Customized Products

	Motor size		Page
	42 mm sq. to ϕ106 mm (1.65 inch sq. to ϕ4.17 inch) 		p. 93

Synchronous Motors

Customized Products

	Motor size		Page
	56 mm sq. to ϕ106 mm (2.20 inch sq. to ϕ4.17 inch) 		p. 93

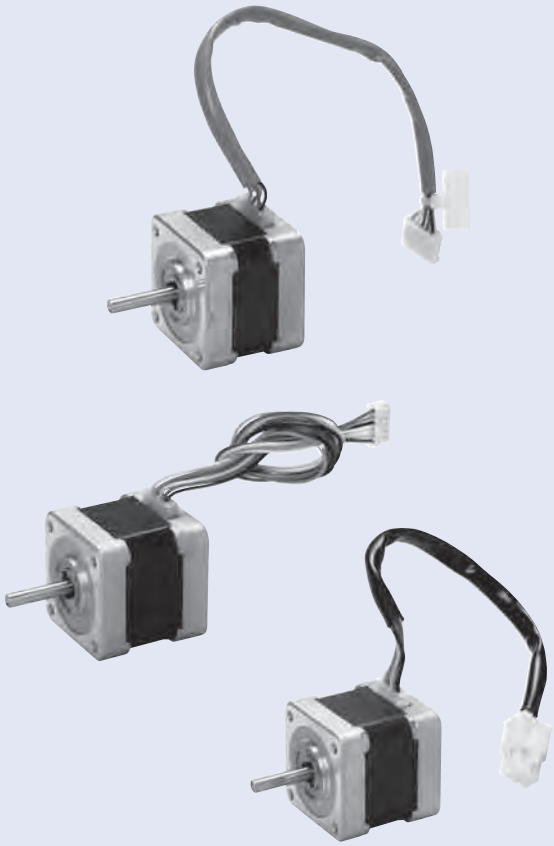
Customization

Different types of customization are possible, depending on the request and quantity. Contact us for details.

Manufacturing example

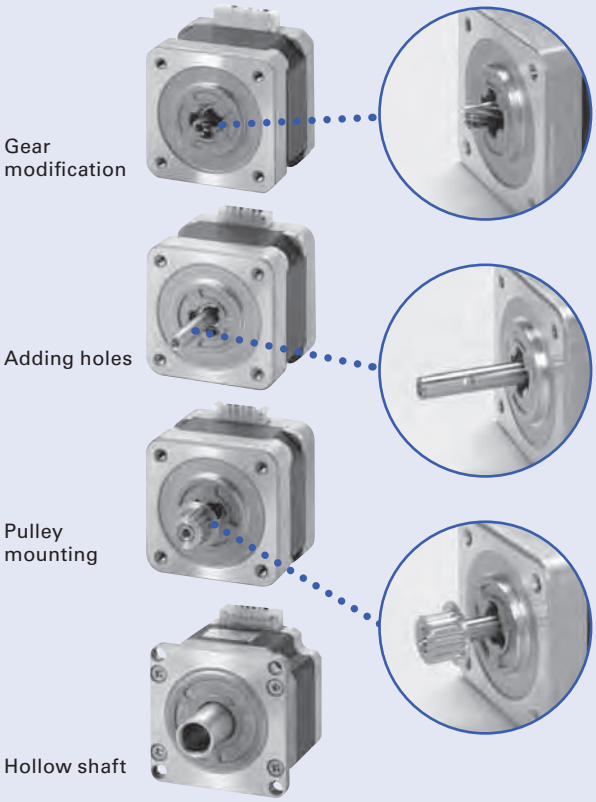
Harness modification

Connectors, cable ties, and plastic tubing can be added.



Shaft modification

D-cuts, key grooves, and through holes can be added; and gears and pulleys can be mounted. The shaft can also be hollowed to allow airflow or to pass lead wires through.



Rotating damper, mounting-side damper

A damper can be added to reduce vibrations when rotating.

Rotating damper

Mounting-side damper

Decelerator, encoder, brake

- A decelerator can be added when a large high-load torque is required at low speeds.
- An encoder can be added in order to detect position and speed.
- A brake can be added to hold the position when the motor is stopped.

With brake+encoder

With decelerator+encoder

Specifications can be customized, depending on the model number and quantity. Contact us for details.

How To Read the Specifications

Bipolar winding, Lead wire type

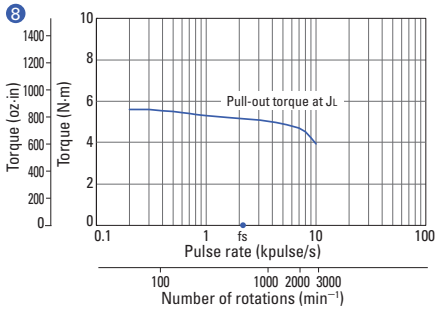
❶ Model number		❷ Holding torque at 2-phase energization	❸ Rated current	❹ Wiring resistance	❺ Winding inductance	❻ Rotor inertia	❼ Mass (Weight)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]
SH2141-5541	**SH2141-5511**	0.0065 (0.92)	0.3	21	4.2	0.00058 (0.0032)	0.028 (0.062)

Characteristics diagram

SH2141-5541
SH2141-5511

Constant current circuit
Source voltage: 24 VDC
Operating current:
0.3 A/phase, 2-phase energization (full-step)
J_L=[0.01 × 10⁻⁴kg·m² (1.80 oz·in²) pulley balancer method]
fs: Maximum self-start frequency when not loaded

❽



❶ This is the stepping motor model number.

❷ This is the maximum torque that occurs with 2-phase excitation of the stepping motor at rated current, causing the shaft to rotate from the outside.

❸ This is the rated current that flows to the motor winding. Allowing this amount of current to flow to the motor will create torque equal to the holding torque value.

❹ This is the resistance for one phase of the stepping motor winding.

❺ This is the inductance for one phase of the stepping motor winding.

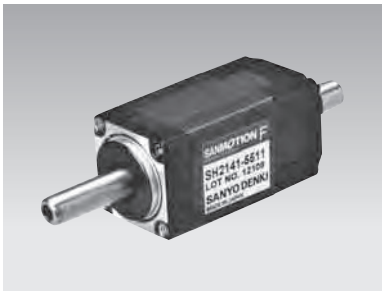
❻ This is the moment of inertia of the rotor, which shows how much torque is required to cause the rotor to accelerate or decelerate.

❼ This is the mass (weight) of the stepping motor.

❽ This graph shows the relationship between the full step pulse rate (frequency), speed, and pull-out torque.

Stepping Motors

Allowable Load, Internal Wiring, Rotation Direction ▶ p. 87
General Specifications ▶ p. 88



14 mm sq. (0.55 inch sq.)

1.8˚ /step **Ultra-compact** **RoHS**

Bipolar winding, Lead wire type

Customizing

Hollow | Shaft modification

Varies depending on the model number and quantity. Contact us for details.

Bipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]
SH2141-5541	**SH2141-5511**	0.0065 (0.92)	0.3	21	4.2	0.00058 (0.0032)	0.028 (0.062)

Characteristics diagram

SH2141-5541
SH2141-5511

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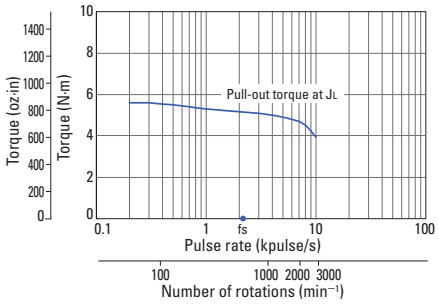
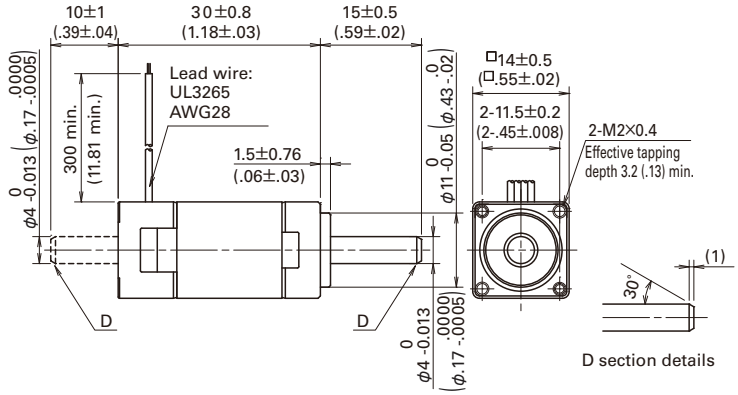
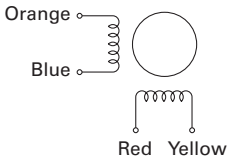
0.3 A/phase, 2-phase energization (full-step)
J_L=[0.01 × 10⁻⁴kg·m² (1.80 oz·in²) pulley balancer method]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



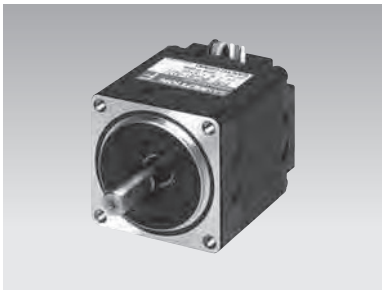
Compatible drivers

Driver is not included.

If you require assistance finding a driver, contact us for details.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.



28 mm sq. (1.10 inch sq.)

1.8˚ /step RoHS

Unipolar winding, Lead wire type

Bipolar winding, Lead wire type ▶p. 56

Customizing

Hollow | Shaft modification | Decelerator | Encoder

Varies depending on the model number and quantity. Contact us for details.

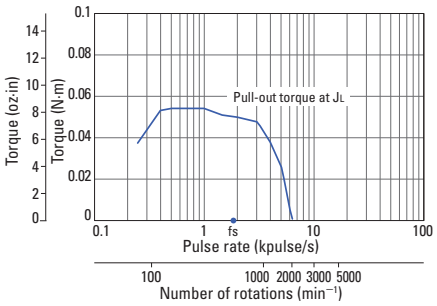
Unipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
SH2281-5171	**SH2281-5131**	0.055 (7.79)	0.5	10.5	3.7	0.01 (0.05)	0.11 (0.24)	32 (1.26)
SH2281-5271	**SH2281-5231**	0.055 (7.79)	1	2.85	1	0.01 (0.05)	0.11 (0.24)	32 (1.26)
SH2285-5171	**SH2285-5131**	0.115 (16.28)	0.5	17	7	0.022 (0.12)	0.2 (0.44)	51.5 (2.03)
SH2285-5271	**SH2285-5231**	0.115 (16.28)	1	4.1	1.9	0.022 (0.12)	0.2 (0.44)	51.5 (2.03)

Characteristics diagram

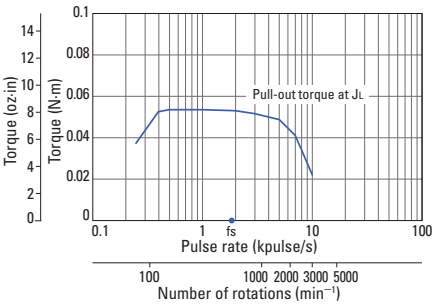
SH2281-5171 SH2281-5131

Constant current circuit
Source voltage: 24 VDC
Operating current: 0.5 A/phase, 2-phase energization (full-step)
J_L=[0.01 × 10⁻⁴kg·m² (1.80 oz·in²) pulley balancer method]
fs: Maximum self-start frequency when not loaded



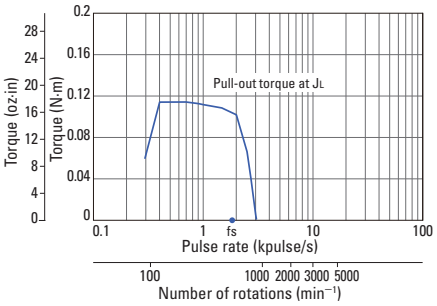
SH2281-5271 SH2281-5231

Constant current circuit
Source voltage: 24 VDC
Operating current: 1 A/phase, 2-phase energization (full-step)
J_L=[0.01 × 10⁻⁴kg·m² (1.80 oz·in²) pulley balancer method]
fs: Maximum self-start frequency when not loaded



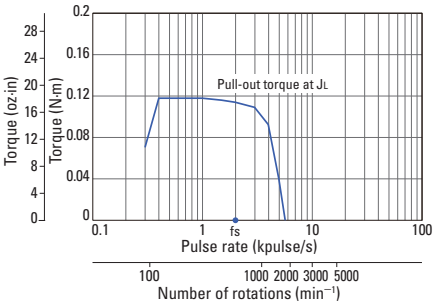
SH2285-5171 SH2285-5131

Constant current circuit
Source voltage: 24 VDC
Operating current: 0.5 A/phase, 2-phase energization (full-step)
J_L=[0.01 × 10⁻⁴kg·m² (1.80 oz·in²) pulley balancer method]
fs: Maximum self-start frequency when not loaded

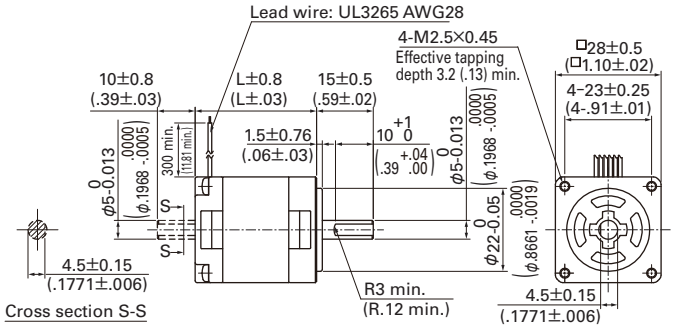


SH2285-5271 SH2285-5231

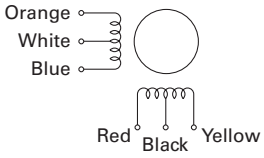
Constant current circuit
Source voltage: 24 VDC
Operating current: 1 A/phase, 2-phase energization (full-step)
J_L=[0.01 × 10⁻⁴kg·m² (1.80 oz·in²) pulley balancer method]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



Compatible drivers

- For motor model number SH228 □ -51 □ 1 (0.5 A/phase)
  Driver is not included.
  If you require assistance finding a driver, contact us for details.
- For model number SH228 □ -52 □ 1 (1 A/phase)
  Model number: BS1D200P10 (DC input)
  Operating current select switch setting: A

The characteristics diagram shown above is from our experimental circuit.

Allowable Load, Rotation Direction ▶p. 87 General Specifications ▶p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

28 mm sq. (1.10 inch sq.)

1.8˚ /step RoHS

Bipolar winding, Lead wire type

Unipolar winding, Lead wire type ▶p. 55

Customizing

Hollow | Shaft modification | Decelerator | Encoder

Varies depending on the model number and quantity. Contact us for details.

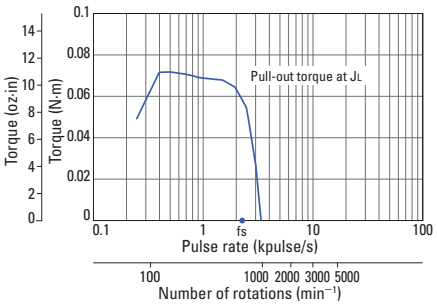
Bipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
SH2281-5671	**SH2281-5631**	0.07 (9.91)	0.5	10.5	7.2	0.01 (0.05)	0.11 (0.24)	32 (1.26)
SH2281-5771	**SH2281-5731**	0.07 (9.91)	1	2.6	1.85	0.01 (0.05)	0.11 (0.24)	32 (1.26)
SH2285-5671	**SH2285-5631**	0.145 (20.53)	0.5	15	13.5	0.022 (0.12)	0.2 (0.44)	51.5 (2.03)
SH2285-5771	**SH2285-5731**	0.145 (20.53)	1	3.75	3.4	0.022 (0.12)	0.2 (0.44)	51.5 (2.03)

Characteristics diagram

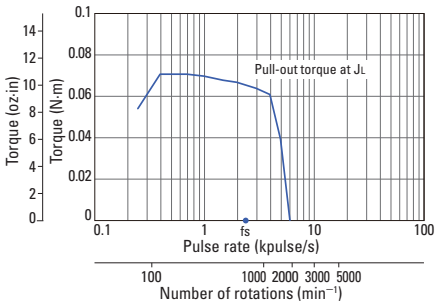
SH2281-5671 SH2281-5631

Constant current circuit
Source voltage: 24 VDC
Operating current:
0.5 A/phase, 2-phase energization (full-step)
J_L=[0.01 × 10⁻⁴kg·m² (1.80 oz·in²) pulley balancer method]
fs: Maximum self-start frequency when not loaded



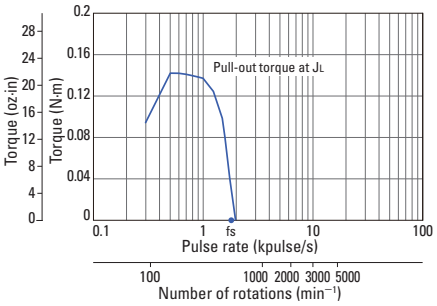
SH2281-5771 SH2281-5731

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.01 × 10⁻⁴kg·m² (1.80 oz·in²) pulley balancer method]
fs: Maximum self-start frequency when not loaded



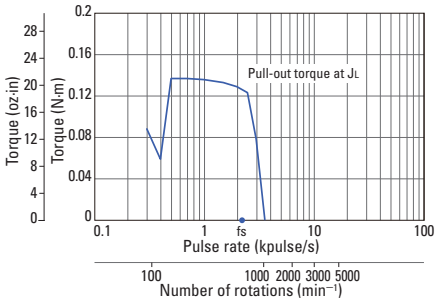
SH2285-5671 SH2285-5631

Constant current circuit
Source voltage: 24 VDC
Operating current:
0.5 A/phase, 2-phase energization (full-step)
J_L=[0.01 × 10⁻⁴kg·m² (1.80 oz·in²) pulley balancer method]
fs: Maximum self-start frequency when not loaded

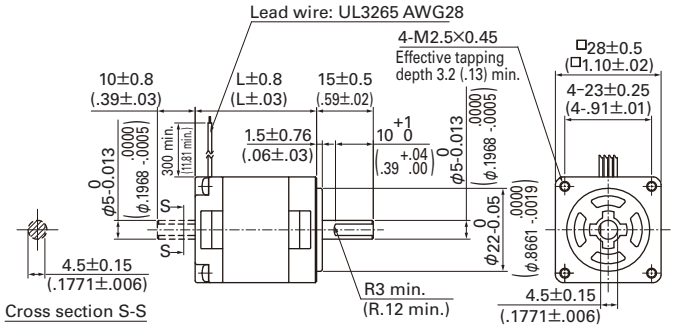


SH2285-5771 SH2285-5731

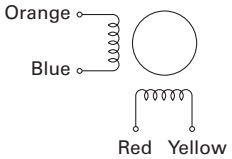
Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.01 × 10⁻⁴kg·m² (1.80 oz·in²) pulley balancer method]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



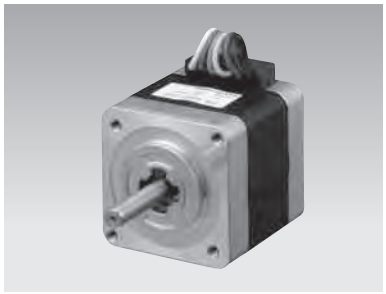
Compatible drivers

- For motor model number SH228 □ -56 □ 1 (0.5 A/phase)
  Driver is not included.
  If you require assistance finding a driver, contact us for details.
- For model number SH228 □ -57 □ 1 (1 A/phase)
  Model number: BS1D200P10 (DC input)
  Operating current select switch setting: A

The characteristics diagram shown above is from our experimental circuit.

Allowable Load, Rotation Direction ▶p. 87 General Specifications ▶p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.



35 mm sq. (1.38 inch sq.)

1.8˚ /step RoHS

Unipolar winding, Lead wire type

Customizing

Hollow | Shaft modification

Varies depending on the model number and quantity. Contact us for details.

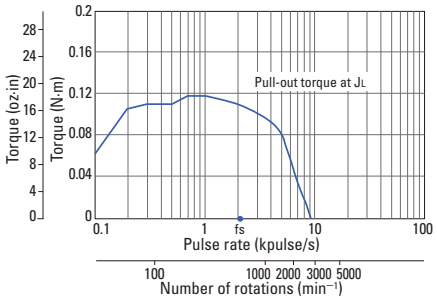
Unipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
SH3533-12U40	**SH3533-12U10**	0.12 (16.99)	1.2	2.4	1.3	0.02 (1.09)	0.17 (0.37)	33 (1.25)
SH3537-12U40	**SH3537-12U10**	0.15 (21.24)	1.2	2.7	2	0.025 (1.37)	0.2 (0.44)	37 (1.54)
SH3552-12U40	**SH3552-12U10**	0.23 (32.57)	1.2	3.4	2.8	0.043 (2.35)	0.3 (0.66)	52 (1.89)

Characteristics diagram

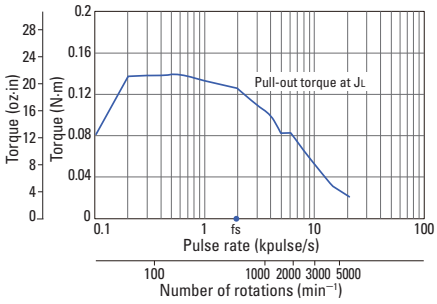
SH3533-12U40
SH3533-12U10

Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
J_L=[0.33 × 10⁻⁴kg·m² (1.80 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



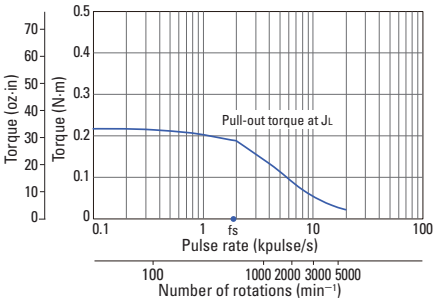
SH3537-12U40
SH3537-12U10

Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
J_L=[0.33 × 10⁻⁴kg·m² (1.80 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

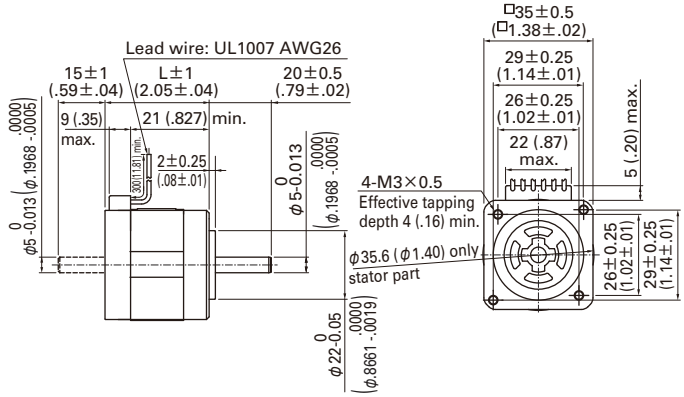


SH3552-12U40
SH3552-12U10

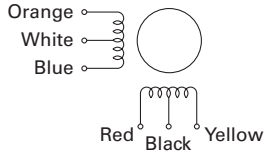
Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



Compatible drivers

Model number: US1D200P10 (DC input)
Operating current select switch setting: 8
The characteristics diagram shown above is from our experimental circuit.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

42 mm sq. (1.65 inch sq.)

0.9˚ /step RoHS

Unipolar winding, Lead wire type
Bipolar winding, Lead wire type

Customizing

Hollow | Shaft modification | Decelerator | Encoder

Varies depending on the model number and quantity. Contact us for details.

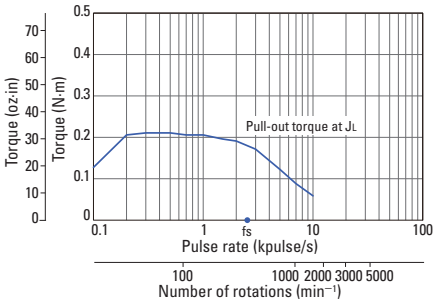
Unipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
SH1421-0441	**SH1421-0411**	0.2 (28.32)	1.2	2.7	3.2	0.044 (0.241)	0.24 (0.53)	33 (1.25)
SH1422-0441	**SH1422-0411**	0.29 (41.07)	1.2	3.1	5.3	0.066 (0.361)	0.29 (0.64)	39 (1.54)
SH1424-0441	**SH1424-0411**	0.39 (55.23)	1.2	3.5	5.3	0.089 (0.487)	0.38 (0.84)	48 (1.89)

Characteristics diagram

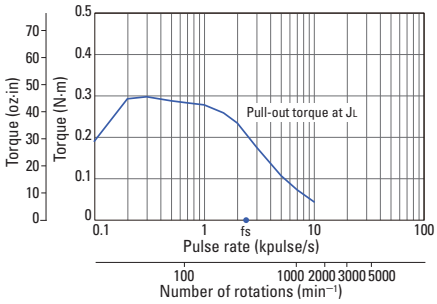
SH1421-0441 SH1421-0411

Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



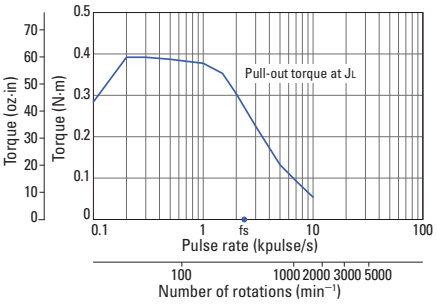
SH1422-0441 SH1422-0411

Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

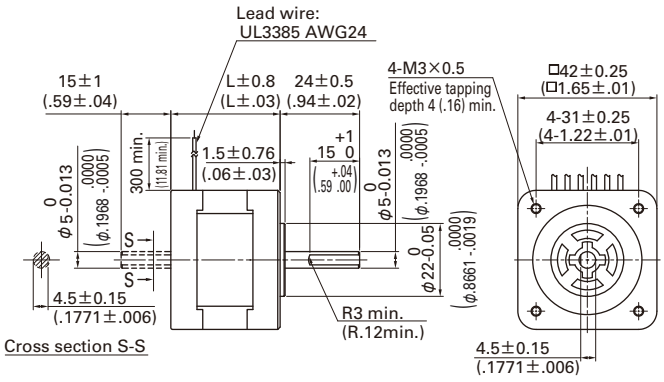


SH1424-0441 SH1424-0411

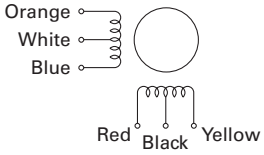
Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



Compatible drivers

Model number: US1D200P10 (DC input)
Operating current select switch setting: 8

The characteristics diagram shown above is from our experimental circuit.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

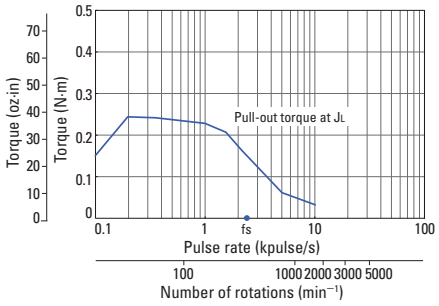
Bipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
SH1421-5041	**SH1421-5011**	0.23 (32.5)	1	3.3	8.0	0.044 (0.24)	0.24 (0.53)	33 (1.25)
SH1421-5241	**SH1421-5211**	0.23 (32.5)	2	0.85	2.1	0.044 (0.24)	0.24 (0.53)	33 (1.25)
SH1422-5041	**SH1422-5011**	0.34 (48.1)	1	4.0	14.0	0.066 (0.36)	0.29 (0.64)	39 (1.54)
SH1422-5241	**SH1422-5211**	0.34 (48.1)	2	1.05	3.6	0.066 (0.36)	0.29 (0.64)	39 (1.54)
SH1424-5041	**SH1424-5011**	0.48 (67.9)	1	4.7	15.0	0.089 (0.49)	0.38 (0.84)	48 (1.89)
SH1424-5241	**SH1424-5211**	0.48 (67.9)	2	1.25	3.75	0.089 (0.49)	0.38 (0.84)	48 (1.89)

Characteristics diagram

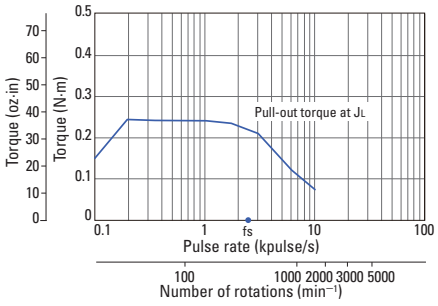
SH1421-5041 SH1421-5011

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



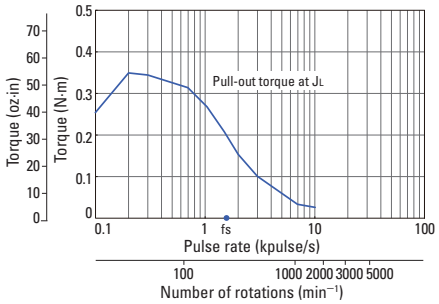
SH1421-5241 SH1421-5211

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



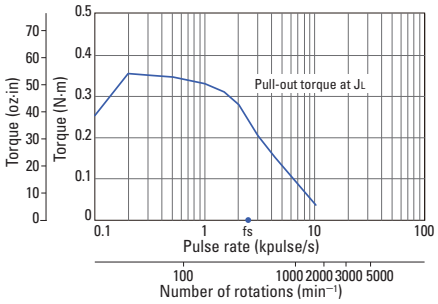
SH1422-5041 SH1422-5011

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



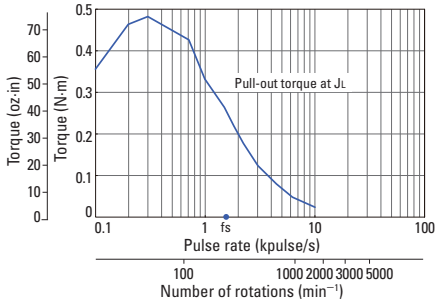
SH1422-5241 SH1422-5211

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



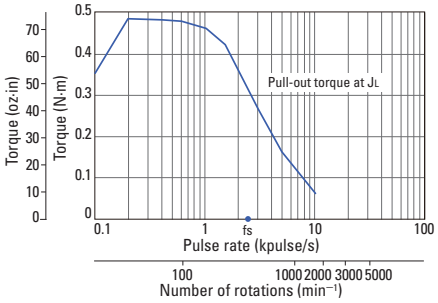
SH1424-5041 SH1424-5011

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

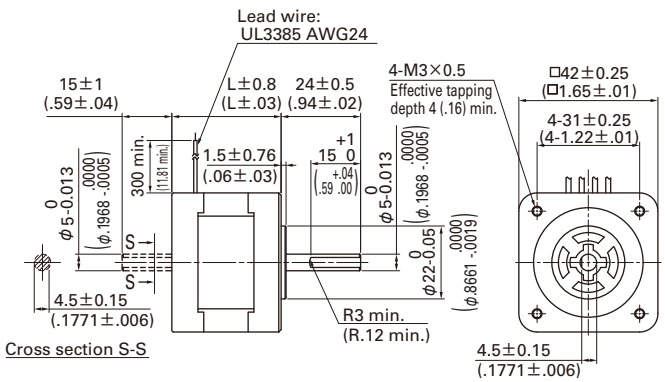


SH1424-5241 SH1424-5211

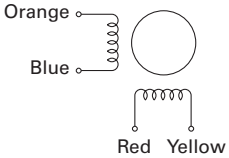
Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



Compatible drivers

- For motor model number SH142 □ -50 □ 1 (1 A/phase)
  Driver is not included.
  If you require assistance finding a driver, contact us for details.
- For model number SH142 □ -52 □ 1 (2 A/phase)
  Model number: BS1D200P10 (DC input)
  Operating current select switch setting: 0

The characteristics diagram shown above is from our experimental circuit.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

42 mm sq. (1.65 inch sq.)

1.8˚ /step Slim form RoHS

Bipolar winding, Lead wire type

Customizing

Hollow Shaft modification

Varies depending on the model number and quantity. Contact us for details.

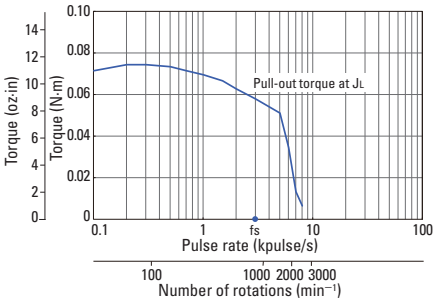
Bipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
SS2421-5041	**SS2421-5011**	0.083 (11.75)	1	3.5	1.2	0.015 (0.082)	0.07 (0.15)	11.6 (.457)
SS2422-5041	**SS2422-5011**	0.186 (26.33)	1	5.4	2.9	0.028 (0.153)	0.14 (0.31)	18.6 (.732)

Characteristics diagram

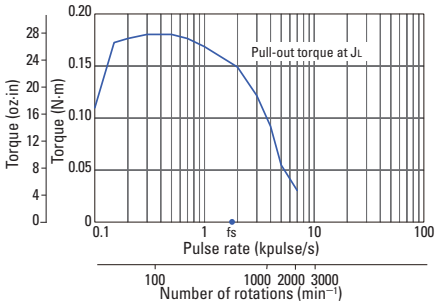
SS2421-5041
SS2421-5011

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.33 × 10⁻⁴kg·m² (1.80 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

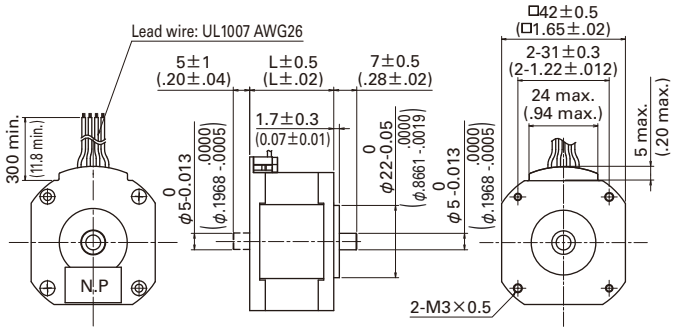


SS2422-5041
SS2422-5011

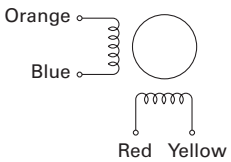
Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.33 × 10⁻⁴kg·m² (1.80 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



Compatible drivers

Driver is not included.

If you require assistance finding a driver, contact us for details.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

42 mm sq. (1.65 inch sq.)

1.8˚ /step RoHS

Unipolar winding, Connector type

Bipolar winding, Lead wire type ▶p. 62

Customizing

Hollow | Shaft modification | Decelerator | Encoder | Brake

Varies depending on the model number and quantity. Contact us for details.

Unipolar winding, Connector type

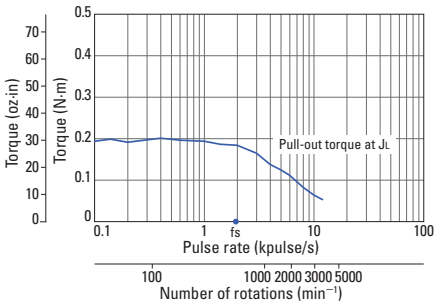
Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H5205-0440	**103H5205-0410**	0.2 (28.32)	1.2	2.4	2.3	0.036 (0.20)	0.23 (0.51)	33 (1.25)
103H5208-0440	**103H5208-0410**	0.3 (42.48)	1.2	2.9	3.4	0.056 (0.31)	0.29 (0.64)	39 (1.54)
103H5209-0440	**103H5209-0410**	0.32 (45.31)	1.2	3	3.9	0.062 (0.34)	0.31 (0.68)	41 (1.61)
103H5210-0440	**103H5210-0410**	0.37 (52.39)	1.2	3.3	3.4	0.074 (0.40)	0.37 (0.82)	48 (1.89)

Motor cable: Model No.4835710-1

Characteristics diagram

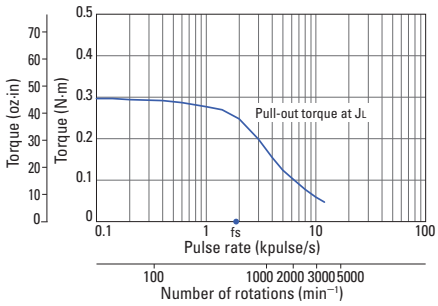
103H5205-0440
103H5205-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



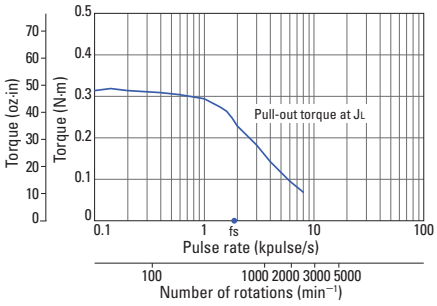
103H5208-0440
103H5208-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



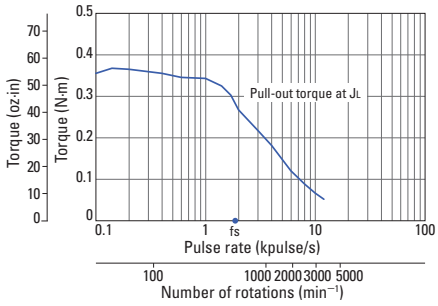
103H5209-0440
103H5209-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

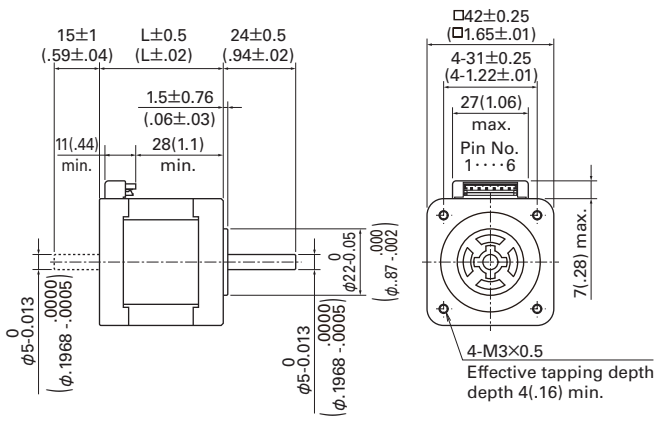


103H5210-0440
103H5210-0410

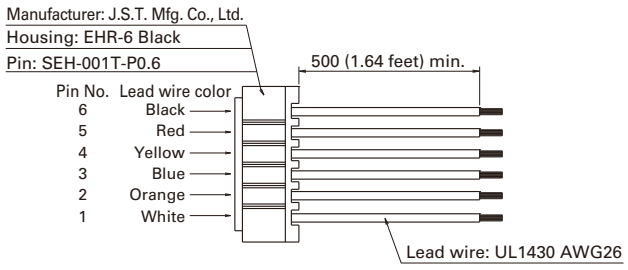
Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]

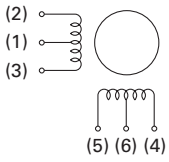


Option (sold separately): Motor cable Model number: 4835710-1



This driver-motor cable is for motor model numbers 103H52□□-04□□.

Internal wiring



Compatible drivers

Model number: US1D200P10

Operating current select switch setting: 8

The characteristics diagram shown above is from our experimental circuit.

Allowable Load, Rotation Direction ▶p. 87 General Specifications ▶p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

42 mm sq. (1.65 inch sq.)

1.8˚ /step RoHS

Bipolar winding, Lead wire type

Unipolar winding, Connector type▶p. 61

Customizing

Hollow | Shaft modification | Decelerator | Encoder | Brake

Varies depending on the model number and quantity. Contact us for details.

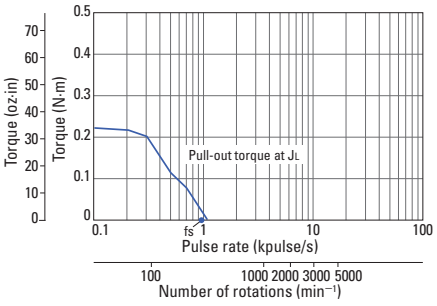
Bipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H5205-5040	103H5205-5010	0.23 (32.57)	0.25	54	78	0.036 (0.20)	0.23 (0.51)	33 (1.25)
103H5205-5140	103H5205-5110	0.25 (35.40)	0.5	13.4	23.4	0.036 (0.20)	0.23 (0.51)	33 (1.25)
103H5205-5240	103H5205-5210	0.265 (37.53)	1	3.4	6.5	0.036 (0.20)	0.23 (0.51)	33 (1.25)
103H5208-5040	103H5208-5010	0.35 (49.56)	0.25	66	116	0.056 (0.31)	0.29 (0.64)	39 (1.54)
103H5208-5140	103H5208-5110	0.38 (53.81)	0.5	16.5	34	0.056 (0.31)	0.29 (0.64)	39 (1.54)
103H5208-5240	103H5208-5210	0.39 (55.23)	1	4.1	9.5	0.056 (0.31)	0.29 (0.64)	39 (1.54)
103H5209-5040	103H5209-5010	0.38 (53.81)	0.25	71.4	133	0.062 (0.34)	0.31 (0.68)	41 (1.61)
103H5209-5140	103H5209-5110	0.41 (58.06)	0.5	18.2	39	0.062 (0.34)	0.31 (0.68)	41 (1.61)
103H5209-5240	103H5209-5210	0.425 (60.18)	1	4.4	11	0.062 (0.34)	0.31 (0.68)	41 (1.61)
103H5210-5040	103H5210-5010	0.465 (65.85)	0.25	80	123.3	0.074 (0.40)	0.37 (0.82)	48 (1.89)
103H5210-5140	103H5210-5110	0.49 (69.39)	0.5	20	35	0.074 (0.40)	0.37 (0.82)	48 (1.89)
103H5210-5240	103H5210-5210	0.51 (72.22)	1	4.8	9.5	0.074 (0.40)	0.37 (0.82)	48 (1.89)

Characteristics diagram

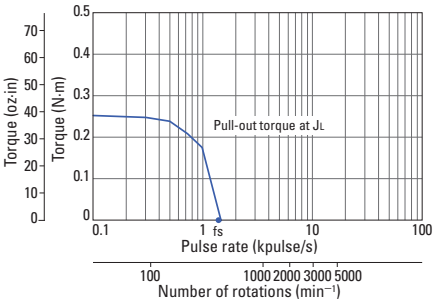
103H5205-5040 / 103H5205-5010

Constant current circuit
Source voltage: 24 VDC
Operating current:
0.25 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



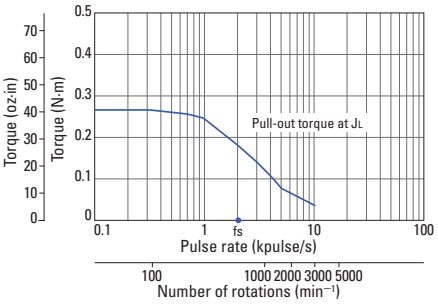
103H5205-5140 / 103H5205-5110

Constant current circuit
Source voltage: 24 VDC
Operating current:
0.5 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



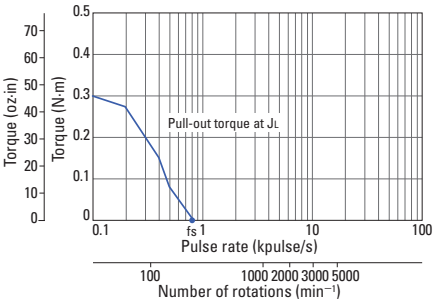
103H5205-5240 / 103H5205-5210

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



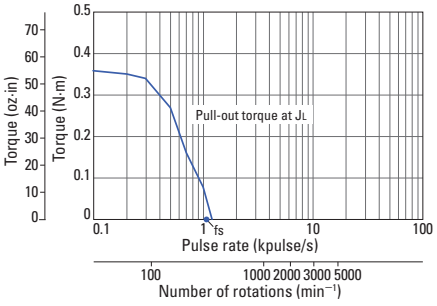
103H5208-5040 / 103H5208-5010

Constant current circuit
Source voltage: 24 VDC
Operating current:
0.25 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



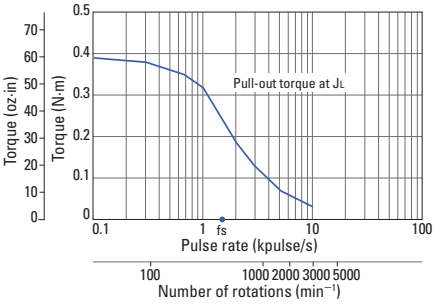
103H5208-5140 / 103H5208-5110

Constant current circuit
Source voltage: 24 VDC
Operating current:
0.5 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



103H5208-5240 / 103H5208-5210

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



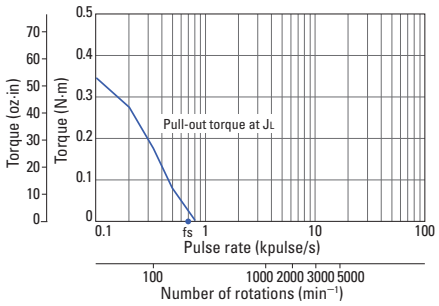
Allowable Load, Rotation Direction▶p. 87 General Specifications▶p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Characteristics diagram

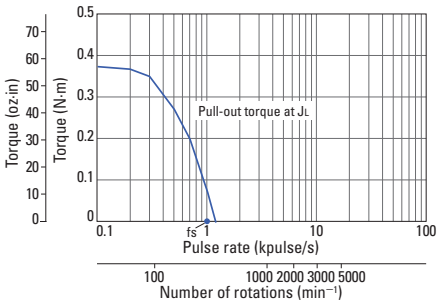
103H5209-5040 103H5209-5010

Constant current circuit
Source voltage: 24 VDC
Operating current:
0.25 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



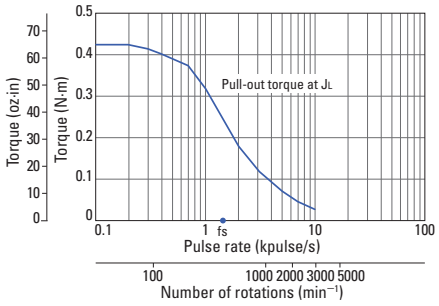
103H5209-5140 103H5209-5110

Constant current circuit
Source voltage: 24 VDC
Operating current:
0.5 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



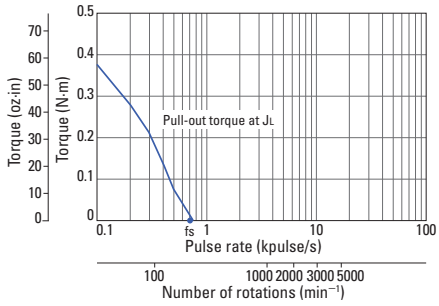
103H5209-5240 103H5209-5210

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



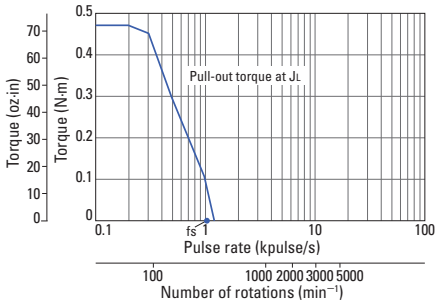
103H5210-5040 103H5210-5010

Constant current circuit
Source voltage: 24 VDC
Operating current:
0.25 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



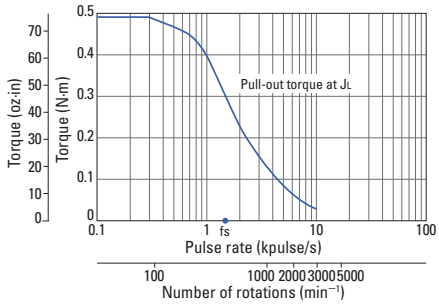
103H5210-5140 103H5210-5110

Constant current circuit
Source voltage: 24 VDC
Operating current:
0.5 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

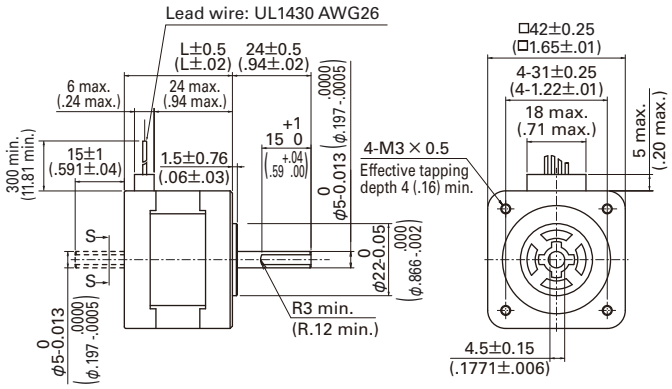


103H5210-5240 103H5210-5210

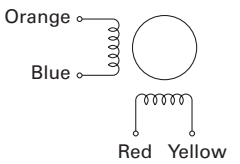
Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



Compatible drivers

- For motor model number 103H52 □□ -50 □ 0 (0.25 A/phase), 103H52 □□ -51 □□ (0.5 A/phase)
  Driver is not included.
  If you require assistance finding a driver, contact us for details.
- For model number 103H52 □□ -52 □□ (1 A/phase)
  Model number: BS1D200P10 (DC input)
  Operating current select switch setting: A

The characteristics diagram shown above is from our experimental circuit.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

50 mmsq. (1.97 inch sq.)

1.8˚ /step RoHS

Unipolar winding, Lead wire type

Bipolar winding, Lead wire type ▶ p. 66

Customizing

Hollow | Shaft modification

Varies depending on the model number and quantity. Contact us for details.

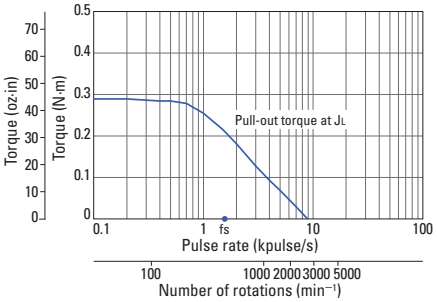
Unipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H6701-0140	**103H6701-0110**	0.28 (39.6)	1	4.3	6.8	0.057 (0.31)	0.35 (0.77)	39.8 (1.57)
103H6701-0440	**103H6701-0410**	0.28 (39.6)	2	1.1	1.6	0.057 (0.31)	0.35 (0.77)	39.8 (1.57)
103H6701-0740	**103H6701-0710**	0.28 (39.6)	3	0.6	0.7	0.057 (0.31)	0.35 (0.77)	39.8 (1.57)
103H6703-0140	**103H6703-0110**	0.49 (69.4)	1	6	13	0.118 (0.65)	0.5 (1.10)	51.3 (2.02)
103H6703-0440	**103H6703-0410**	0.49 (69.4)	2	1.6	3.2	0.118 (0.65)	0.5 (1.10)	51.3 (2.02)
103H6703-0740	**103H6703-0710**	0.49 (69.4)	3	0.83	1.4	0.118 (0.65)	0.5 (1.10)	51.3 (2.02)
103H6704-0140	**103H6704-0110**	0.53 (75.1)	1	6.5	16.5	0.14 (0.77)	0.55 (1.21)	55.8 (2.20)
103H6704-0440	**103H6704-0410**	0.52 (73.6)	2	1.7	3.8	0.14 (0.77)	0.55 (1.21)	55.8 (2.20)
103H6704-0740	**103H6704-0710**	0.53 (75.1)	3	0.9	1.7	0.14 (0.77)	0.55 (1.21)	55.8 (2.20)

Characteristics diagram

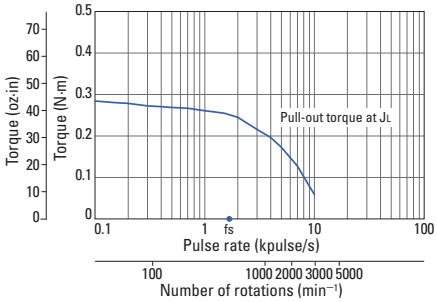
103H6701-0140 / 103H6701-0110

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



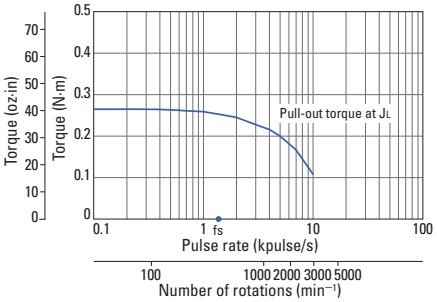
103H6701-0440 / 103H6701-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



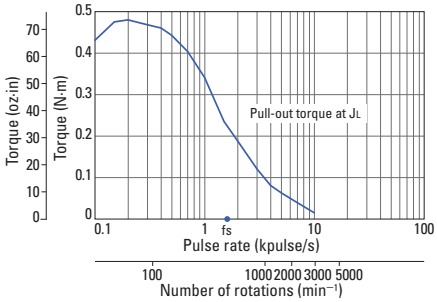
103H6701-0740 / 103H6701-0710

Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



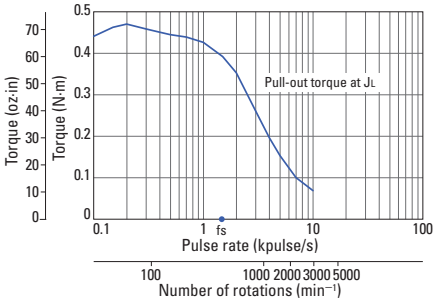
103H6703-0140 / 103H6703-0110

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



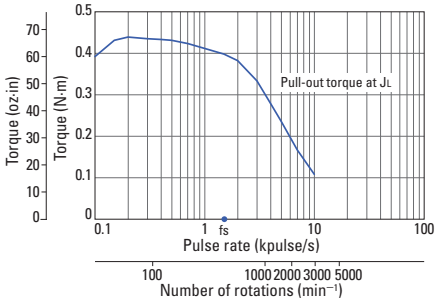
103H6703-0440 / 103H6703-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



103H6703-0740 / 103H6703-0710

Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



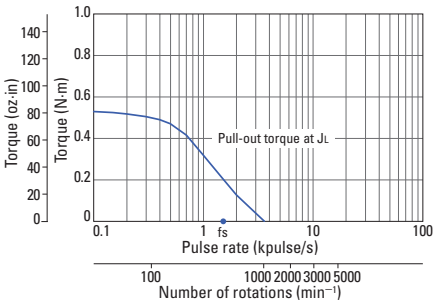
Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Characteristics diagram

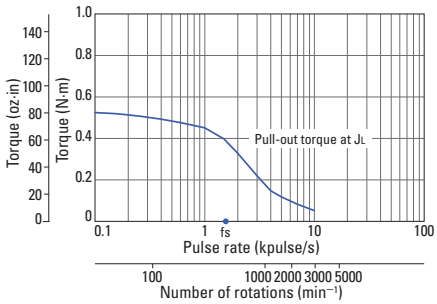
103H6704-0140
103H6704-0110

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



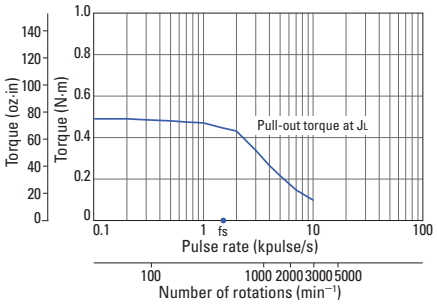
103H6704-0440
103H6704-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

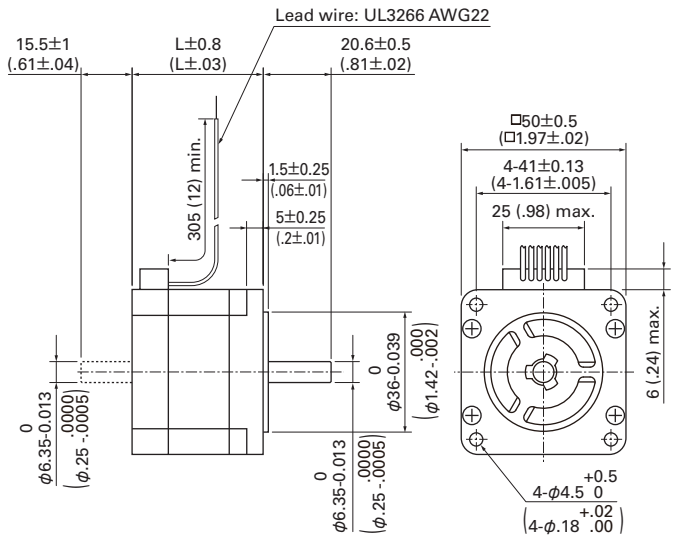


103H6704-0740
103H6704-0710

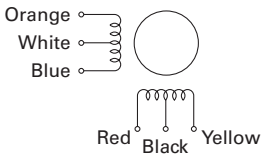
Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10^{-4}kg·m^2 (5.14 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



Compatible drivers

- For motor model number 103H670 □ -01 □ 0 (1 A/phase), 103H670 □ -07 □ 0 (3 A/phase)
  Driver is not included.
  If you require assistance finding a driver, contact us for details.
- For model number 103H670 □ -04 □ 0 (2 A/phase)
  Model number: US1D200P10 (DC input)
  Operating current select switch setting: 0

The characteristics diagram shown above is from our experimental circuit.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

50 mm sq. (1.97 inch sq.)

1.8˚ /step RoHS

Bipolar winding, Lead wire type

Unipolar winding, Lead wire type ▶ p. 64

Customizing

Hollow | Shaft modification

Varies depending on the model number and quantity. Contact us for details.

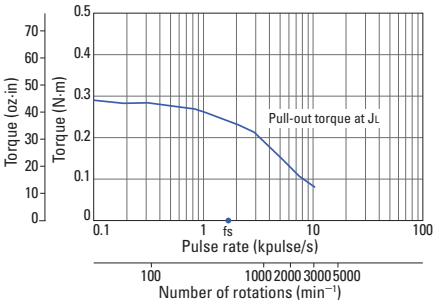
Bipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H6701-5040	**103H6701-5010**	0.28 (39.6)	2	0.6	1.6	0.057 (0.31)	0.35 (0.77)	39.8 (1.57)
103H6703-5040	**103H6703-5010**	0.49 (69.4)	2	0.8	3.2	0.118 (0.65)	0.5 (1.10)	51.3 (2.02)
103H6704-5040	**103H6704-5010**	0.52 (73.6)	2	0.9	3.8	0.14 (0.77)	0.55 (1.21)	55.8 (2.20)

Characteristics diagram

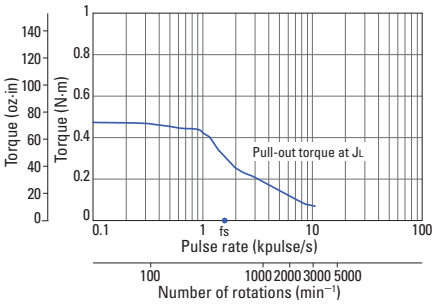
103H6701-5040
103H6701-5010

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



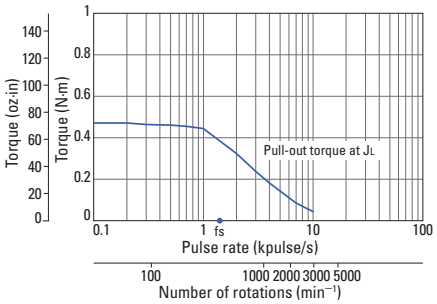
103H6703-5040
103H6703-5010

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

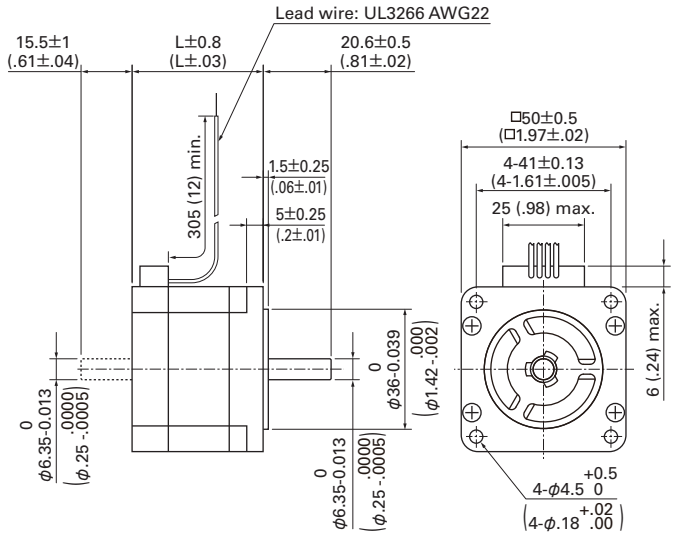


103H6704-5040
103H6704-5010

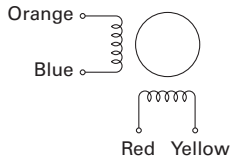
Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



Compatible drivers

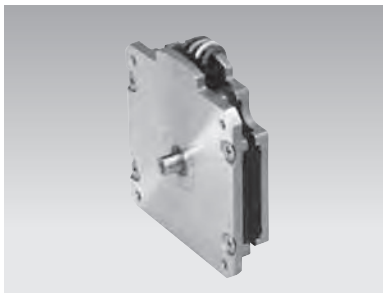
Model number: BS1D200P10 (DC input)

Operating current select switch setting: 0

The characteristics diagram shown above is from our experimental circuit.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.



50 mm sq. (1.97 inch sq.)

1.8˚ /step 薄型 RoHS

Bipolar winding, Lead wire type

Customizing

Hollow Shaft modification

Varies depending on the model number and quantity. Contact us for details.

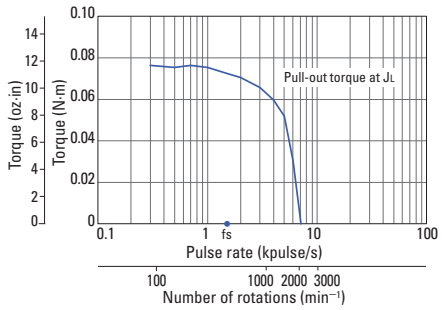
Bipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
SS2501-8040	**SS2501-8010**	0.1 (14.16)	1	4.5	2	0.026 (0.142)	0.09 (0.20)	11.4 (.43)
SS2502-8040	**SS2502-8010**	0.215 (30.44)	1	5.9	3.2	0.049 (0.268)	0.15 (0.33)	16.4 (.63)

Characteristics diagram

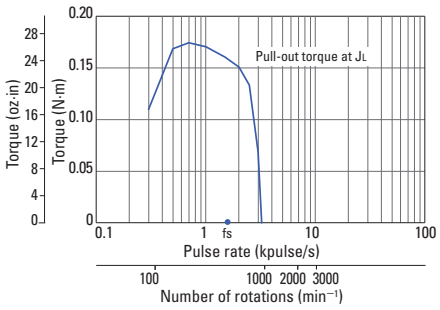
SS2501-8040
SS2501-8010

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
JL=[0.01 × 10⁻⁴kg·m² (1.80 oz·in²) pulley balancer method]
fs: Maximum self-start frequency when not loaded

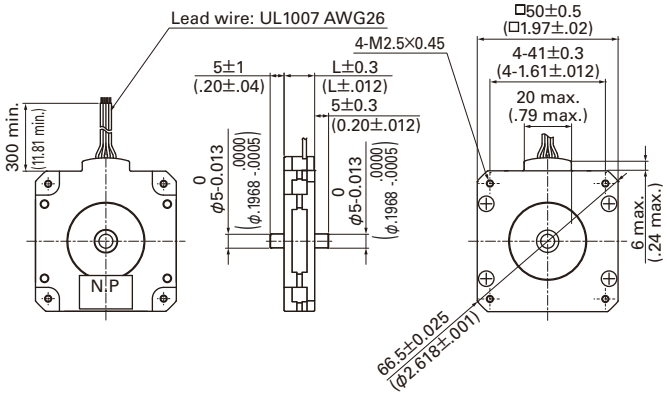


SS2502-8040
SS2502-8010

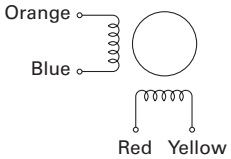
Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
JL=[0.01 × 10⁻⁴kg·m² (1.80 oz·in²) pulley balancer method]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



Compatible drivers

Driver is not included.

If you require assistance finding a driver, contact us for details.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

56 mm sq. (2.20 inch sq.)

1.8˚ /step RoHS

Unipolar winding, Lead wire type

Bipolar winding, Lead wire type▶p. 70

Customizing

Hollow | Shaft modification | Decelerator | Encoder

Varies depending on the model number and quantity. Contact us for details.

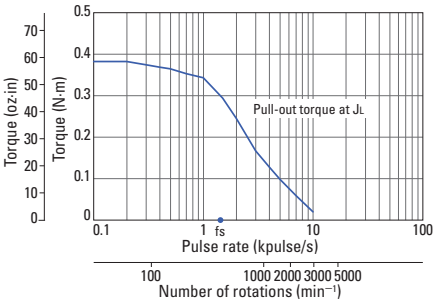
Unipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H7121-0140	**103H7121-0110**	0.39 (55.2)	1	4.8	8	0.1 (0.55)	0.47 (1.04)	41.8 (1.65)
103H7121-0440	**103H7121-0410**	0.39 (55.2)	2	1.25	1.9	0.1 (0.55)	0.47 (1.04)	41.8 (1.65)
103H7121-0740	**103H7121-0710**	0.39 (55.2)	3	0.6	0.8	0.1 (0.55)	0.47 (1.04)	41.8 (1.65)
103H7123-0140	**103H7123-0110**	0.83 (117.5)	1	6.7	15	0.21 (1.15)	0.65 (1.43)	53.8 (2.12)
103H7123-0440	**103H7123-0410**	0.83 (117.5)	2	1.6	3.8	0.21 (1.15)	0.65 (1.43)	53.8 (2.12)
103H7123-0740	**103H7123-0710**	0.78 (110.5)	3	0.77	1.58	0.21 (1.15)	0.65 (1.43)	53.8 (2.12)
103H7124-0140	**103H7124-0110**	0.98 (138.8)	1	7	14.5	0.245 (1.34)	0.8 (1.76)	63.8 (2.51)
103H7124-0440	**103H7124-0410**	0.98 (138.8)	2	1.7	3.1	0.245 (1.34)	0.8 (1.76)	63.8 (2.51)
103H7124-0740	**103H7124-0710**	0.98 (138.8)	3	0.74	1.4	0.245 (1.34)	0.8 (1.76)	63.8 (2.51)
103H7126-0140	**103H7126-0110**	1.27 (179.8)	1	8.6	19	0.36 (1.97)	0.98 (2.16)	75.8 (2.98)
103H7126-0440	**103H7126-0410**	1.27 (179.8)	2	2	4.5	0.36 (1.97)	0.98 (2.16)	75.8 (2.98)
103H7126-0740	**103H7126-0710**	1.27 (179.8)	3	0.9	2.2	0.36 (1.97)	0.98 (2.16)	75.8 (2.98)

Characteristics diagram

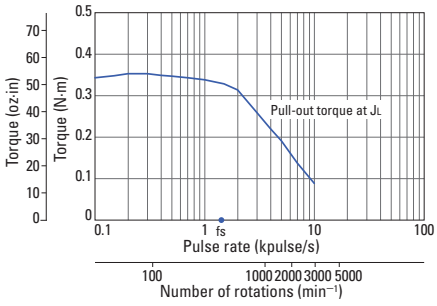
103H7121-0140 / 103H7121-0110

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



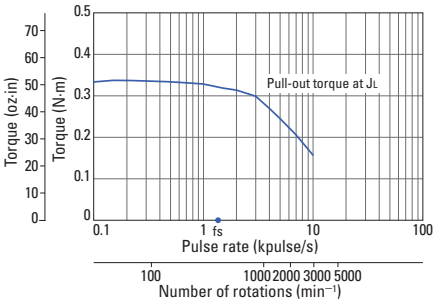
103H7121-0440 / 103H7121-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



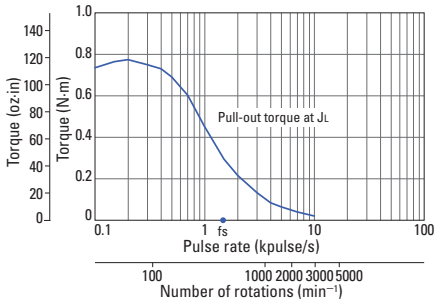
103H7121-0740 / 103H7121-0710

Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



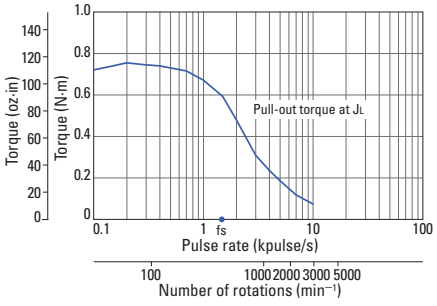
103H7123-0140 / 103H7123-0110

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



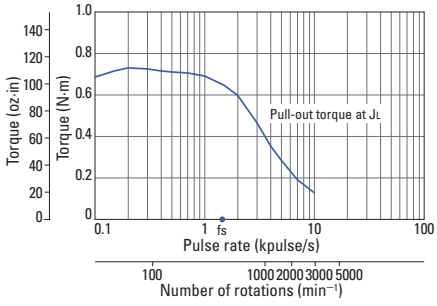
103H7123-0440 / 103H7123-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



103H7123-0740 / 103H7123-0710

Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



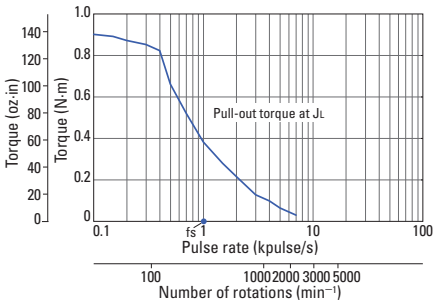
Allowable Load, Rotation Direction▶p. 87 General Specifications▶p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Characteristics diagram

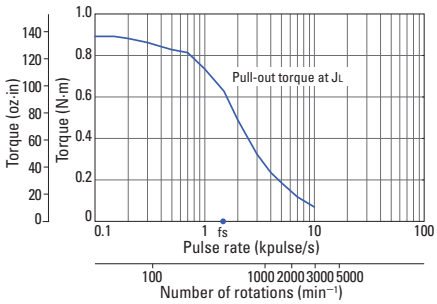
103H7124-0140 / 103H7124-0110

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10^{-4}kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



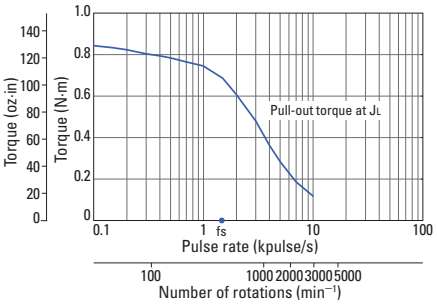
103H7124-0440 / 103H7124-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10^{-4}kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



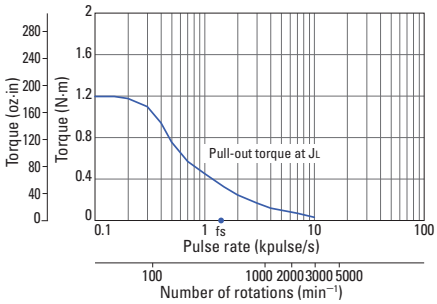
103H7124-0740 / 103H7124-0710

Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10^{-4}kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



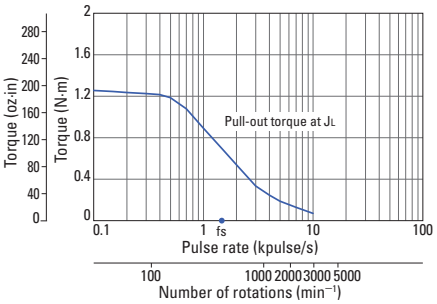
103H7126-0140 / 103H7126-0110

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10^{-4}kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



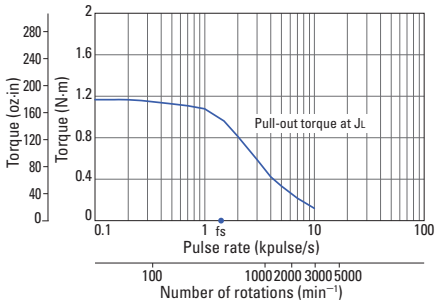
103H7126-0440 / 103H7126-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10^{-4}kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

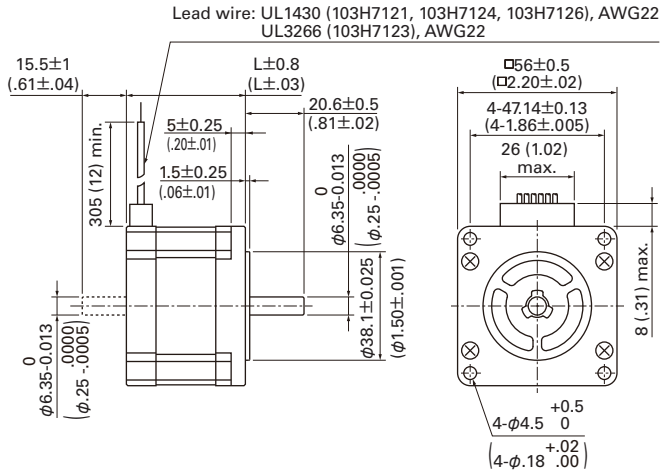


103H7126-0740 / 103H7126-0710

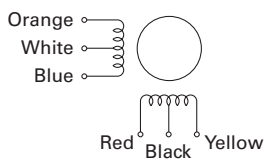
Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10^{-4}kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



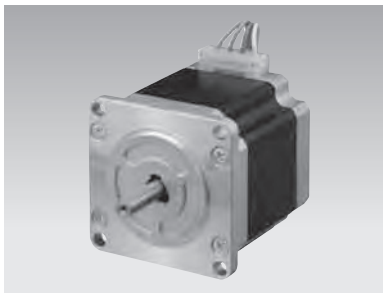
Compatible drivers

- For motor model number 103H712 □ -01 □ 0 (1 A/phase), 103H712 □ -07 □ 0 (3 A/phase)
  Driver is not included.
  If you require assistance finding a driver, contact us for details.
- For model number 103H712 □ -04 □ 0 (2 A/phase)
  Model number: US1D200P10 (DC input)
  Operating current select switch setting: 0

The characteristics diagram shown above is from our experimental circuit.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.



56 mm sq. (2.20 inch sq.)

1.8˚ /step RoHS

Bipolar winding, Lead wire type

Unipolar winding, Lead wire type ▶p. 68

Customizing

Hollow | Shaft modification | Decelerator | Encoder

Varies depending on the model number and quantity. Contact us for details.

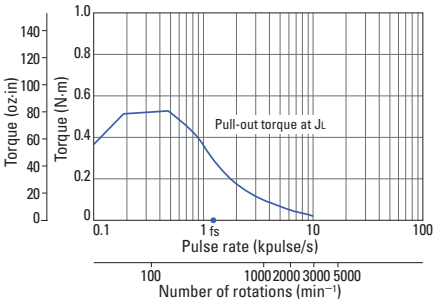
Bipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)	Shaft diameter (D)	Dcut thickness (T)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)	mm (in)	mm (in)
103H7121-5640	**103H7121-5610**	0.55 (77.9)	1	4.3	14.5	0.1 (0.55)	0.47 (1.04)	41.8 (1.65)	ϕ 6.35 (ϕ 0.25)	5.8 (0.23)
103H7121-5740	**103H7121-5710**	0.55 (77.9)	2	1.1	3.7	0.1 (0.55)	0.47 (1.04)	41.8 (1.65)	ϕ 6.35 (ϕ 0.25)	5.8 (0.23)
103H7121-5840	**103H7121-5810**	0.55 (77.9)	3	0.54	1.74	0.1 (0.55)	0.47 (1.04)	41.8 (1.65)	ϕ 6.35 (ϕ 0.25)	5.8 (0.23)
103H7123-5640	**103H7123-5610**	1.0 (141.6)	1	5.7	29.4	0.21 (1.15)	0.65 (1.43)	53.8 (2.12)	ϕ 6.35 (ϕ 0.25)	5.8 (0.23)
103H7123-5740	**103H7123-5710**	1.0 (141.6)	2	1.5	7.5	0.21 (1.15)	0.65 (1.43)	53.8 (2.12)	ϕ 6.35 (ϕ 0.25)	5.8 (0.23)
103H7123-5840	**103H7123-5810**	1.0 (141.6)	3	0.7	3.5	0.21 (1.15)	0.65 (1.43)	53.8 (2.12)	ϕ 6.35 (ϕ 0.25)	5.8 (0.23)
103H7126-5640	**103H7126-5610**	1.6 (226.6)	1	7.7	34.6	0.36 (1.97)	0.98 (2.16)	75.8 (2.98)	ϕ 6.35 (ϕ 0.25)	5.8 (0.23)
103H7126-5740	**103H7126-5710**	1.6 (226.6)	2	2	9.1	0.36 (1.97)	0.98 (2.16)	75.8 (2.98)	ϕ 6.35 (ϕ 0.25)	5.8 (0.23)
103H7126-5840	**103H7126-5810**	1.6 (226.6)	3	0.94	4	0.36 (1.97)	0.98 (2.16)	75.8 (2.98)	ϕ 6.35 (ϕ 0.25)	5.8 (0.23)
103H7128-5640	**103H7128-5610**	2.0 (283.2)	1	8.9	40.1	0.49 (2.68)	1.3 (2.87)	94.8 (3.73)	ϕ 8 (ϕ 0.31)	7.5 (0.30)
103H7128-5740	**103H7128-5710**	2.0 (283.2)	2	2.3	10.4	0.49 (2.68)	1.3 (2.87)	94.8 (3.73)	ϕ 8 (ϕ 0.31)	7.5 (0.30)
103H7128-5840	**103H7128-5810**	2.0 (283.2)	3	1.03	4.3	0.49 (2.68)	1.3 (2.87)	94.8 (3.73)	ϕ 8 (ϕ 0.31)	7.5 (0.30)

Characteristics diagram

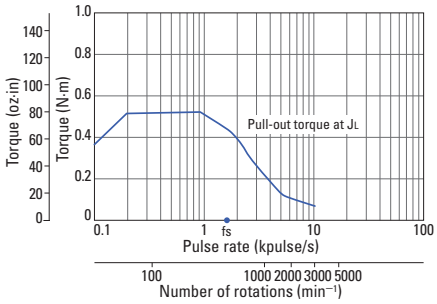
103H7121-5640 103H7121-5610

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



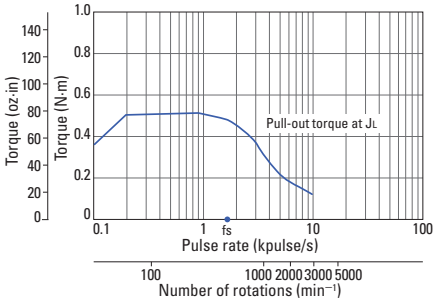
103H7121-5740 103H7121-5710

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



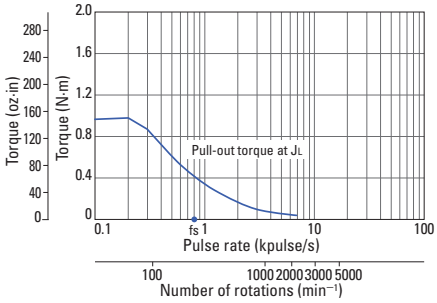
103H7121-5840 103H7121-5810

Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



103H7123-5640 103H7123-5610

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



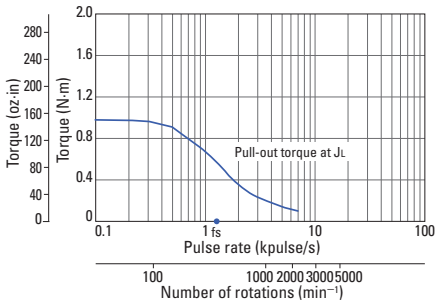
Allowable Load, Rotation Direction ▶p. 87 General Specifications ▶p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Characteristics diagram

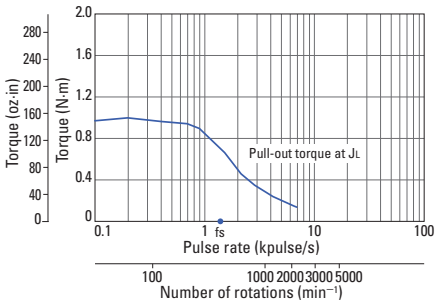
103H7123-5740
103H7123-5710

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10^{-4}kg·m^2 (14.22 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



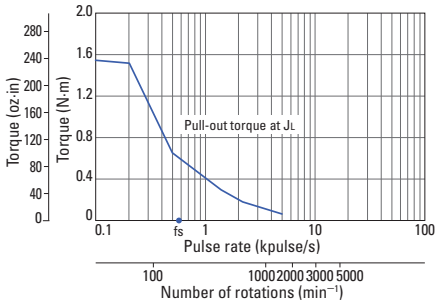
103H7123-5840
103H7123-5810

Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10^{-4}kg·m^2 (14.22 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



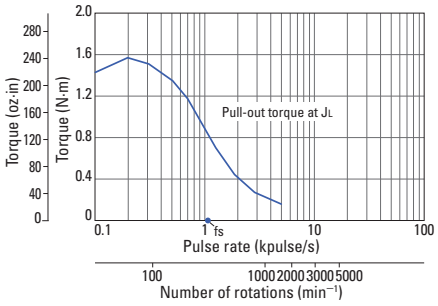
103H7126-5640
103H7126-5610

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10^{-4}kg·m^2 (14.22 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



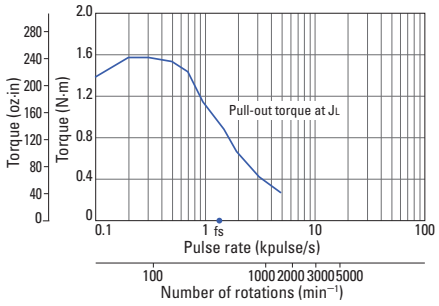
103H7126-5740
103H7126-5710

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10^{-4}kg·m^2 (14.22 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



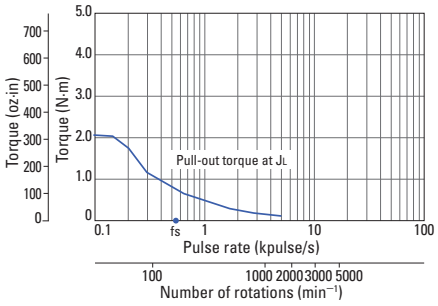
103H7126-5840
103H7126-5810

Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10^{-4}kg·m^2 (14.22 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



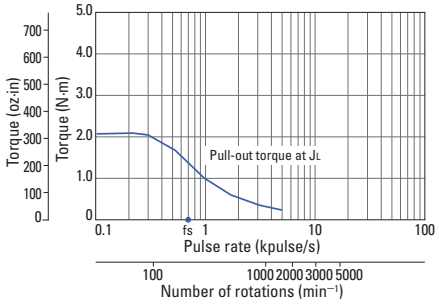
103H7128-5640
103H7128-5610

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10^{-4}kg·m^2 (40.46 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



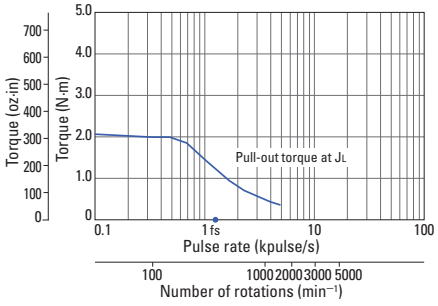
103H7128-5740
103H7128-5710

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10^{-4}kg·m^2 (40.46 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

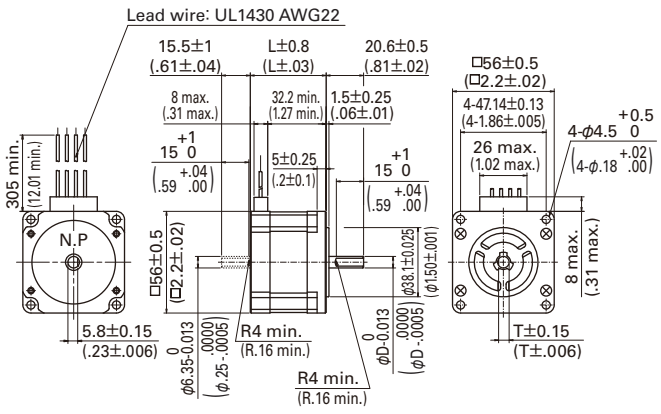


103H7128-5840
103H7128-5810

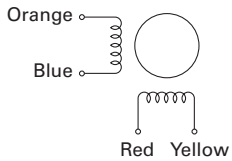
Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10-^{4k}g·m^2 (40.46 oz·in2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



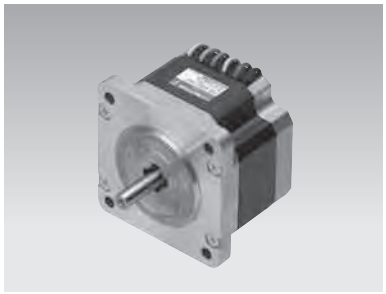
Compatible drivers

Driver is not included.

If you require assistance finding a driver, contact us for details.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.



60 mm sq. (2.36 inch sq.)

0.9° /step RoHS

Unipolar winding, Lead wire type
Bipolar winding, Lead wire type

Customizing

Hollow | Shaft modification | Decelerator | Encoder

Varies depending on the model number and quantity. Contact us for details.

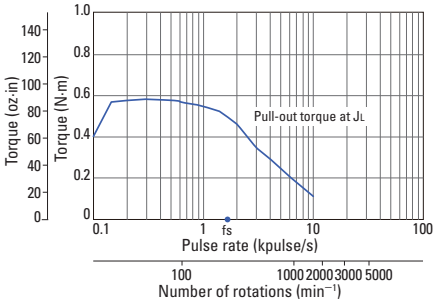
Unipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)	Shaft diameter (D)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/ phase	Ω / phase	mH/ phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)	mm (in)
SH1601-0440	**SH1601-0410**	0.57 (80.71)	2	1.35	2	0.24 (1.312)	0.55 (1.21)	42 (1.65)	0 / ϕ 6.35-0.013 | .0000 / ϕ .25-.0005
SH1602-0440	**SH1602-0410**	1.1 (155.77)	2	1.8	3.5	0.4 (2.187)	0.8 (1.76)	54 (2.13)	0 / ϕ 6.35-0.013 | .0000 / ϕ .25-.0005
SH1603-0440	**SH1603-0410**	1.7 (240.74)	2	2.3	4.5	0.75 (4.101)	1.2 (2.64)	76 (2.99)	0 / ϕ 8-0.015 | .0000 / ϕ .31-.0006

Characteristics diagram

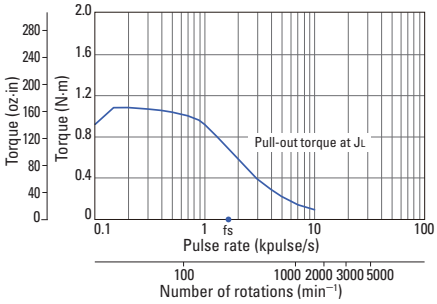
SH1601-0440 SH1601-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



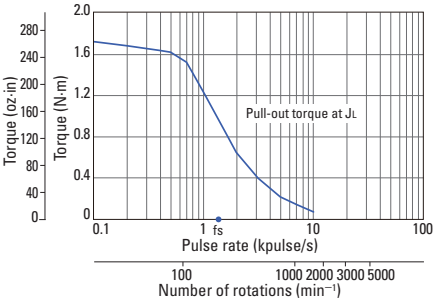
SH1602-0440 SH1602-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

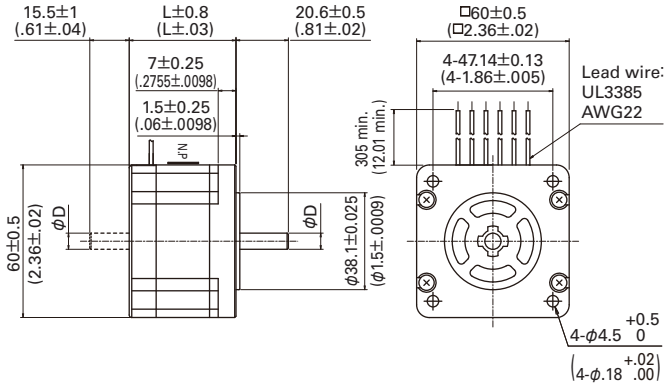


SH1603-0440 SH1603-0410

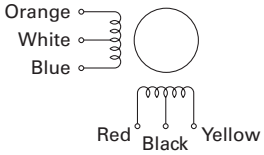
Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10⁻⁴kg·m² (40.46 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



Compatible drivers

Driver is not included.

If you require assistance finding a driver, contact us for details.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

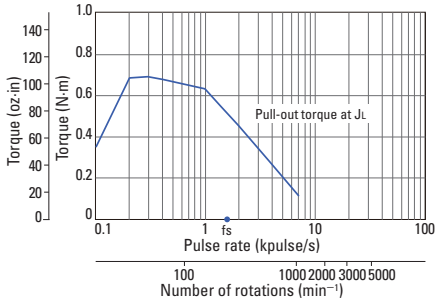
Bipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)	Shaft diameter (D)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/ phase	Ω / phase	mH/ phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)	mm (in)
SH1601-5240	**SH1601-5210**	0.69 (97.7)	2	1.2	3.5	0.24 (1.31)	0.55 (1.21)	42 (1.65)	0 / ϕ 6.35-0.013 | .0000 / ϕ .25-.0005
SH1602-5240	**SH1602-5210**	1.28 (181.2)	2	1.65	6.1	0.4 (2.19)	0.8 (1.76)	54 (2.13)	0 / ϕ 6.35-0.013 | .0000 / ϕ .25-.0005
SH1603-5240	**SH1603-5210**	2.15 (304.4)	2	2.3	8.8	0.75 (4.10)	1.2 (2.65)	76 (2.99)	0 / ϕ 8-0.015 | .0000 / ϕ .31-.0006

Characteristics diagram

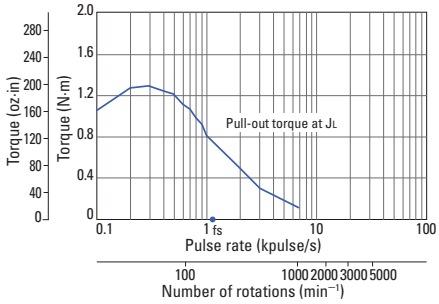
SH1601-5240 SH1601-5210

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



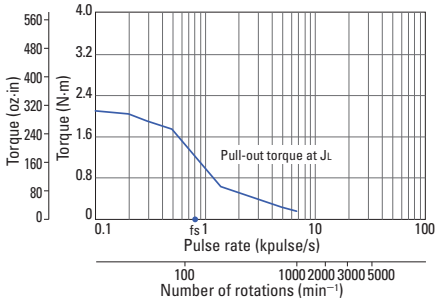
SH1602-5240 SH1602-5210

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

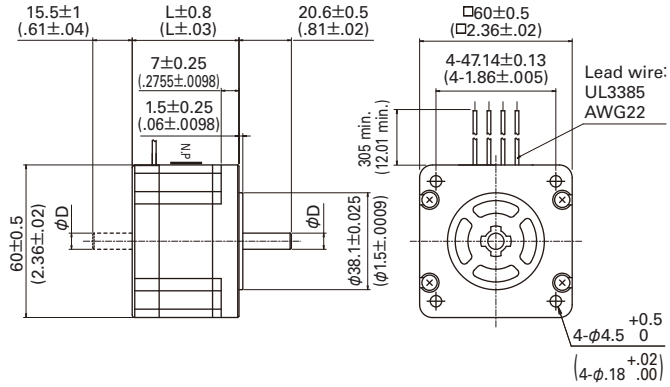


SH1603-5240 SH1603-5210

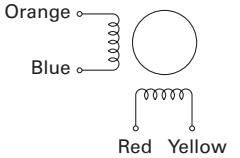
Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10⁻⁴kg·m² (40.46 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring

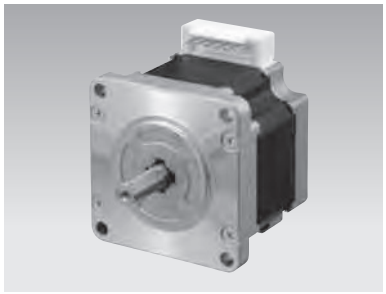


Compatible drivers

Model number: BS1D200P10 (DC input)
Operating current select switch setting: 0
The characteristics diagram shown above is from our experimental circuit.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.



60 mm sq. (2.36 inch sq.)

1.8˚ /step RoHS

Unipolar winding, Connector type
Unipolar winding, Lead wire type
Dimensions for attaching NEMA23 are interchangeable (47.14 mm-pitch)
Bipolar winding, Connector type ▶p. 76
Bipolar winding, Lead wire type
Dimensions for attaching NEMA23 are interchangeable (47.14 mm-pitch) ▶p. 76

Customizing
Hollow | Shaft modification | Decelerator | Encoder | Brake

Varies depending on the model number and quantity. Contact us for details.

Unipolar winding, Connector type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H7821-0140	**103H7821-0110**	0.78 (110.5)	1	5.7	8.3	0.275 (1.50)	0.6 (1.32)	44.8 (1.76)
103H7821-0440	**103H7821-0410**	0.78 (110.5)	2	1.5	2	0.275 (1.50)	0.6 (1.32)	44.8 (1.76)
103H7821-0740	**103H7821-0710**	0.78 (110.5)	3	0.68	0.8	0.275 (1.50)	0.6 (1.32)	44.8 (1.76)
103H7822-0140	**103H7822-0110**	1.17 (165.7)	1	6.9	14	0.4 (2.19)	0.77 (1.70)	53.8 (2.12)
103H7822-0440	**103H7822-0410**	1.17 (165.7)	2	1.8	3.6	0.4 (2.19)	0.77 (1.70)	53.8 (2.12)
103H7822-0740	**103H7822-0710**	1.17 (165.7)	3	0.8	1.38	0.4 (2.19)	0.77 (1.70)	53.8 (2.12)
103H7823-0140	**103H7823-0110**	2.1 (297.4)	1	10	21.7	0.84 (4.59)	1.34 (2.95)	85.8 (3.38)
103H7823-0440	**103H7823-0410**	2.1 (297.4)	2	2.7	5.6	0.84 (4.59)	1.34 (2.95)	85.8 (3.38)
103H7823-0740	**103H7823-0710**	2.1 (297.4)	3	1.25	2.4	0.84 (4.59)	1.34 (2.95)	85.8 (3.38)

Motor cable: Model No. 4837798-1

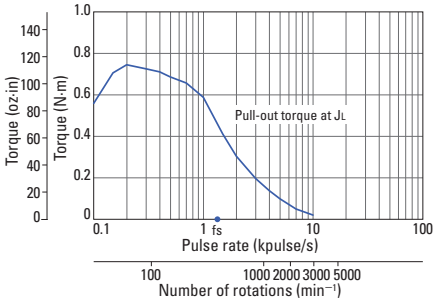
Unipolar winding, Lead wire type Dimensions for attaching NEMA23 are interchangeable (47.14 mm-pitch)

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H7821-0160	**103H7821-0130**	0.78 (110.5)	1	5.7	8.3	0.275 (1.50)	0.6 (1.32)	43.5 (1.71)
103H7821-0460	**103H7821-0430**	0.78 (110.5)	2	1.5	2	0.275 (1.50)	0.6 (1.32)	43.5 (1.71)
103H7821-0760	**103H7821-0730**	0.78 (110.5)	3	0.68	0.8	0.275 (1.50)	0.6 (1.32)	43.5 (1.71)
103H7822-0160	**103H7822-0130**	1.17 (165.7)	1	6.9	14	0.4 (2.19)	0.77 (1.70)	52.5 (2.07)
103H7822-0460	**103H7822-0430**	1.17 (165.7)	2	1.8	3.6	0.4 (2.19)	0.77 (1.70)	52.5 (2.07)
103H7822-0760	**103H7822-0730**	1.17 (165.7)	3	0.8	1.38	0.4 (2.19)	0.77 (1.70)	52.5 (2.07)
103H7823-0160	**103H7823-0130**	2.1 (297.4)	1	10	21.7	0.84 (4.59)	1.34 (2.95)	84.5 (3.33)
103H7823-0460	**103H7823-0430**	2.1 (297.4)	2	2.7	5.6	0.84 (4.59)	1.34 (2.95)	84.5 (3.33)
103H7823-0760	**103H7823-0730**	2.1 (297.4)	3	1.25	2.4	0.84 (4.59)	1.34 (2.95)	84.5 (3.33)

Characteristics diagram

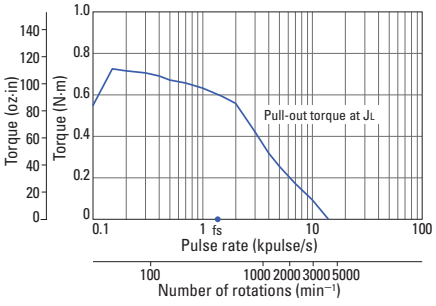
103H7821-0140
103H7821-0110
103H7821-0160
103H7821-0130

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



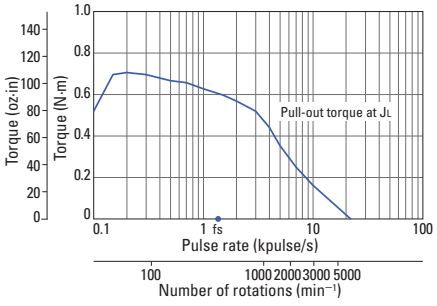
103H7821-0440
103H7821-0410
103H7821-0460
103H7821-0430

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



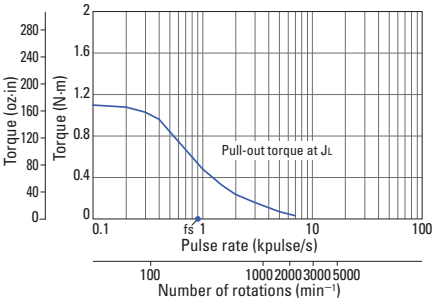
103H7821-0740
103H7821-0710
103H7821-0760
103H7821-0730

Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



103H7822-0140
103H7822-0110
103H7822-0160
103H7822-0130

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



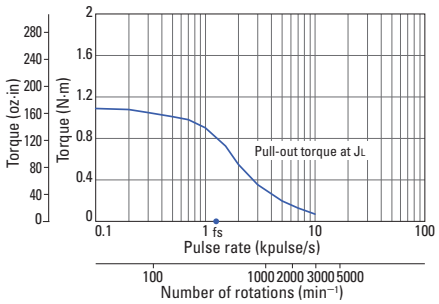
Allowable Load, Rotation Direction ▶p. 87 General Specifications ▶p. 88
Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Characteristics diagram

103H7822-0440
103H7822-0410

103H7822-0460
103H7822-0430

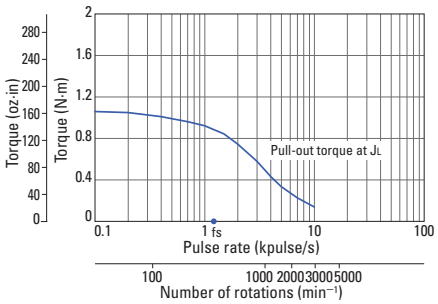
Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10^{-4}kg·m^2 (14.22 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



103H7822-0740
103H7822-0710

103H7822-0760
103H7822-0730

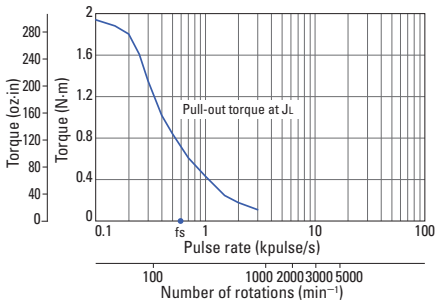
Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10^{-4}kg·m^2 (14.22 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



103H7823-0140
103H7823-0110

103H7823-0160
103H7823-0130

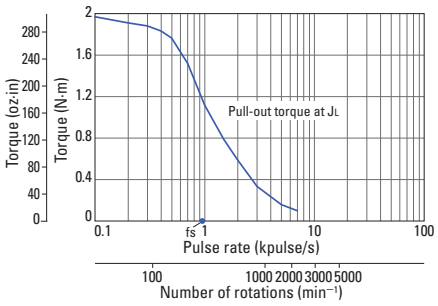
Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10^{-4}kg·m^2 (40.46 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



103H7823-0440
103H7823-0410

103H7823-0460
103H7823-0430

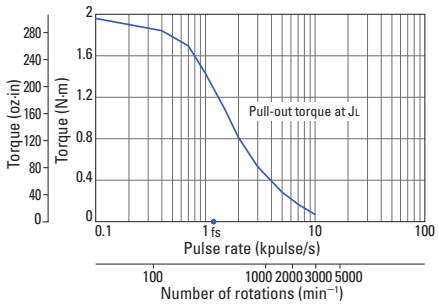
Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10^{-4}kg·m^2 (40.46 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



103H7823-0740
103H7823-0710

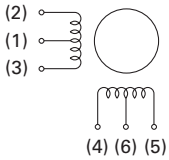
103H7823-0760
103H7823-0730

Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10^{-4}kg·m^2 (40.46 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

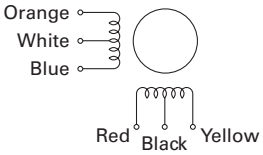


Internal wiring

Connector type
( ) connector pin number

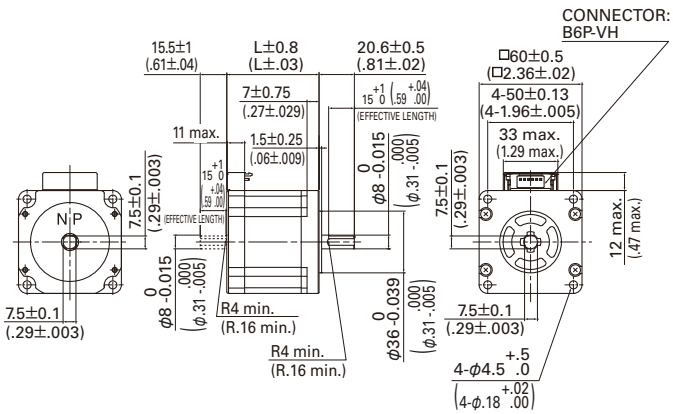


Lead wire type

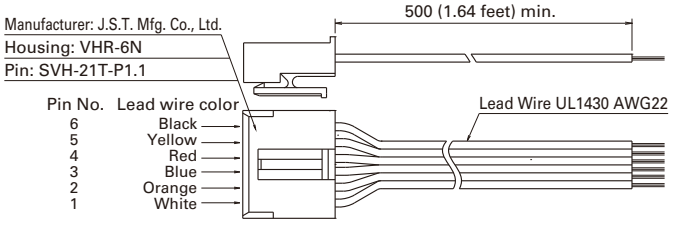


Dimensions [Unit: mm (inch)]

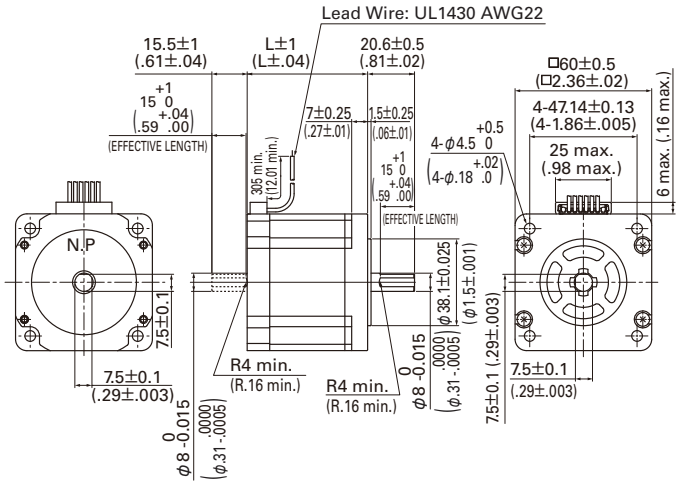
Connector type



Motor cable Unipolar Model number: 4837798-1



Lead wire type



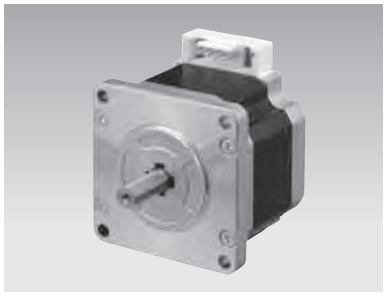
Compatible drivers

- For motor model number 103H782 □ -01 □ 0 (1 A/phase), 103H782 □ -07 □ 0 (3 A/phase)
  Driver is not included.
  If you require assistance finding a driver, contact us for details.
- For model number 103H782 □ -04 □ 0 (2 A/phase)
  Model number: US1D200P10 (DC input)
  Operating current select switch setting: 0

The characteristics diagram shown above is from our experimental circuit.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.



60 mm sq. (2.36 inch sq.)

1.8˚ /step RoHS

Bipolar winding, Connector type
Bipolar winding, Lead wire type
Dimensions for attaching NEMA23 are interchangeable (47.14 mm-pitch)
Unipolar winding, Connector type▶p. 74
Unipolar winding, Lead wire type
Dimensions for attaching NEMA23 are interchangeable (47.14 mm-pitch)▶p. 74

Customizing

Hollow | Shaft modification | Decelerator | Encoder | Brake

Varies depending on the model number and quantity. Contact us for details.

Bipolar winding, Connector type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H7821-5740	**103H7821-5710**	0.88 (124.6)	2	1.27	3.3	0.275 (1.50)	0.6 (1.32)	44.8 (1.76)
103H7821-1740	**103H7821-1710**	0.88 (124.6)	4	0.35	0.8	0.275 (1.50)	0.6 (1.32)	44.8 (1.76)
103H7822-5740	**103H7822-5710**	1.37 (194.0)	2	1.55	5.5	0.4 (2.19)	0.77 (1.70)	53.8 (2.12)
103H7822-1740	**103H7822-1710**	1.37 (194.0)	4	0.43	1.38	0.4 (2.19)	0.77 (1.70)	53.8 (2.12)
103H7823-5740	**103H7823-5710**	2.7 (382.3)	2	2.4	9.5	0.84 (4.59)	1.34 (2.95)	85.8 (3.38)
103H7823-1740	**103H7823-1710**	2.7 (382.3)	4	0.65	2.4	0.84 (4.59)	1.34 (2.95)	85.8 (3.38)

Motor cable: Model No. 4837961-1

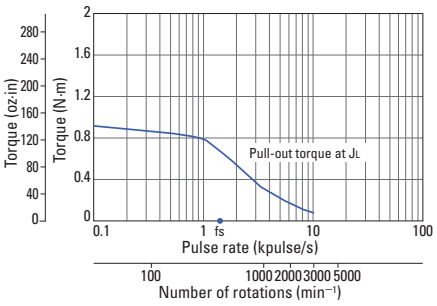
Bipolar winding, Lead wire type Dimensions for attaching NEMA23 are interchangeable (47.14 mm-pitch)

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H7821-5760	**103H7821-5730**	0.88 (124.6)	2	1.27	3.3	0.275 (1.50)	0.6 (1.32)	43.5 (1.71)
103H7821-1760	**103H7821-1730**	0.88 (124.6)	4	0.35	0.8	0.275 (1.50)	0.6 (1.32)	43.5 (1.71)
103H7822-5760	**103H7822-5730**	1.37 (194.0)	2	1.55	5.5	0.4 (2.19)	0.77 (1.70)	52.5 (2.07)
103H7822-1760	**103H7822-1730**	1.37 (194.0)	4	0.43	1.38	0.4 (2.19)	0.77 (1.70)	52.5 (2.07)
103H7823-5760	**103H7823-5730**	2.7 (382.3)	2	2.4	9.5	0.84 (4.59)	1.34 (2.95)	84.5 (3.33)
103H7823-1760	**103H7823-1730**	2.7 (382.3)	4	0.65	2.4	0.84 (4.59)	1.34 (2.95)	84.5 (3.33)

Characteristics diagram

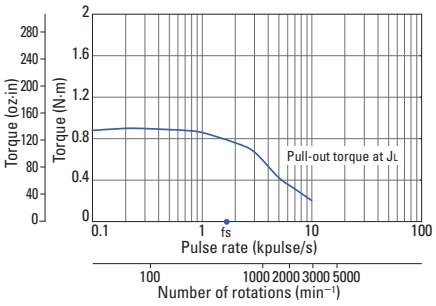
103H7821-5740
103H7821-5710
103H7821-5760
103H7821-5730

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



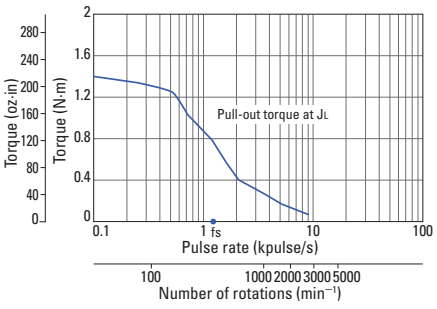
103H7821-1740
103H7821-1710
103H7821-1760
103H7821-1730

Constant current circuit
Source voltage: 24 VDC
Operating current:
4 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



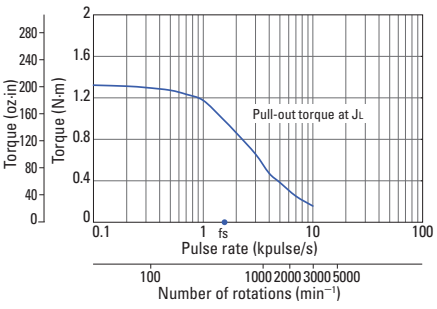
103H7822-5740
103H7822-5710
103H7822-5760
103H7822-5730

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



103H7822-1740
103H7822-1710
103H7822-1760
103H7822-1730

Constant current circuit
Source voltage: 24 VDC
Operating current:
4 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



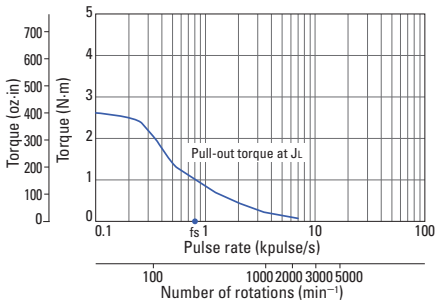
Allowable Load, Rotation Direction▶p. 87 General Specifications▶p. 88
Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Characteristics diagram

103H7823-5740
103H7823-5710

103H7823-5760
103H7823-5730

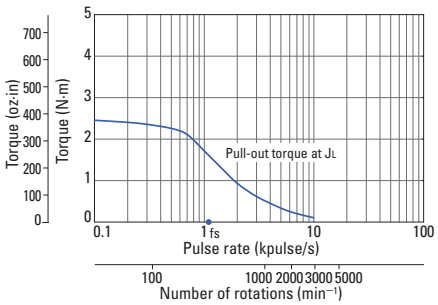
Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10^{-4}kg·m^2 (40.46 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



103H7823-1740
103H7823-1710

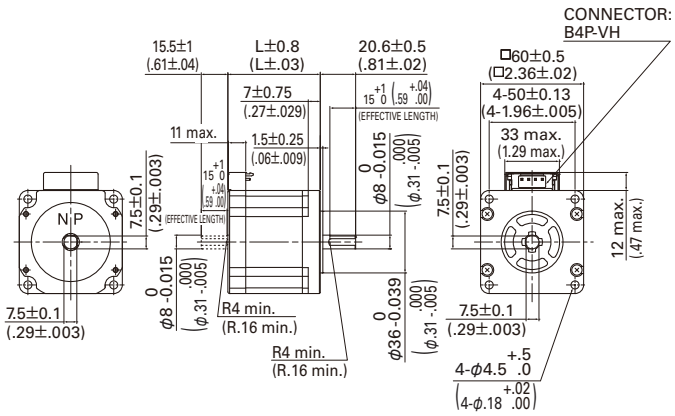
103H7823-1760
103H7823-1730

Constant current circuit
Source voltage: 24 VDC
Operating current:
4 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10^{-4}kg·m^2 (40.46 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

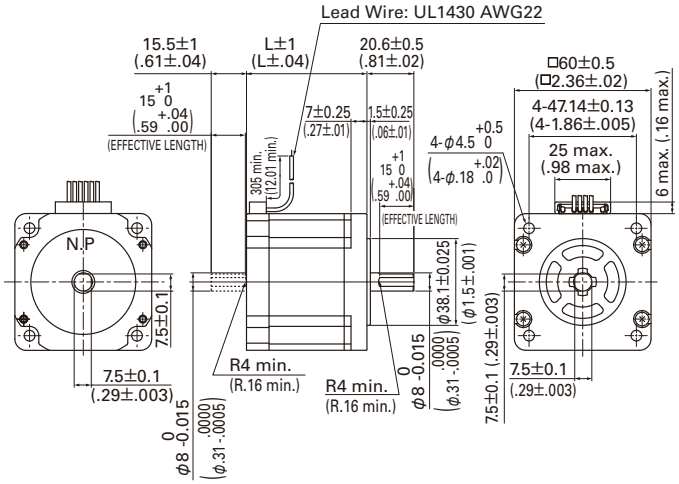


Dimensions [Unit: mm (inch)]

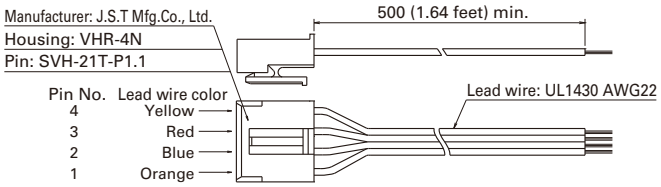
Connector type



Lead wire type



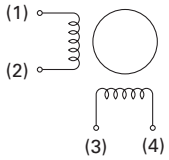
Motor cable Bipolar Model number: 4837961-1



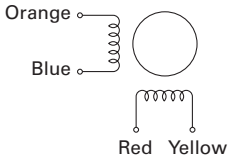
Internal wiring

Connector type

( ) connector pin number, terminal block number



Lead wire type

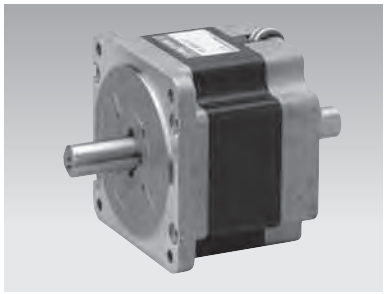


Compatible drivers

- For motor model number 103H782 □ -17 □ 0 (4 A/phase)
  Driver is not included.
  If you require assistance finding a driver, contact us for details.
- For motors not listed above (2 A/phase)
  Model number: BS1D200P10 (DC input)
  Operating current select switch setting: 0

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.



86 mm sq. (3.39 inch sq.)

1.8˚ /step RoHS

Unipolar winding, Lead wire type
Unipolar winding, Lead wire type CE/UL model
Bipolar winding, Lead wire type ▶p. 80
Bipolar winding, Lead wire type CE/UL model ▶p. 80
Bipolar winding, Terminal block type CE/UL model ▶p. 80

Customizing

Hollow | Shaft modification | Encoder

Varies depending on the model number and quantity. Contact us for details.

Unipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
SH2861-0441	**SH2861-0411**	2.5 (354)	2	2.3	8.0	1.48 (8.09)	1.75 (3.92)	66 (2.6)
SH2861-0941	**SH2861-0911**	2.5 (354)	4	0.6	2.0	1.48 (8.09)	1.75 (3.92)	66 (2.6)
SH2862-0441	**SH2862-0411**	4.7 (665.6)	2	3.2	13.0	3.0 (16.4)	2.9 (6.5)	96.5 (3.8)
SH2862-0941	**SH2862-0911**	4.7 (665.6)	4	0.85	3.4	3.0 (16.4)	2.9 (6.5)	96.5 (3.8)
SH2863-0441	**SH2863-0411**	6.7 (948.8)	2	4.0	17.0	4.5 (24.6)	4.0 (8.96)	127 (5)
SH2863-0941	**SH2863-0911**	6.7 (948.8)	4	0.9	4.2	4.5 (24.6)	4.0 (8.96)	127 (5)

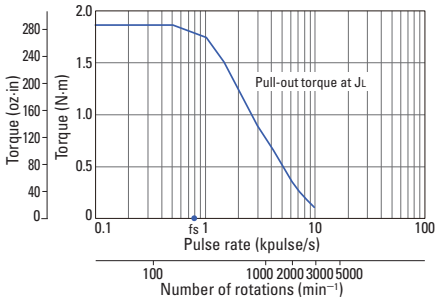
Unipolar winding, Lead wire type CE/UL model

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
SM2861-0451	**SM2861-0421**	2.5 (354)	2	2.3	8.0	1.48 (8.09)	1.75 (3.92)	66 (2.6)
SM2861-0951	**SM2861-0921**	2.5 (354)	4	0.6	2.0	1.48 (8.09)	1.75 (3.92)	66 (2.6)
SM2862-0451	**SM2862-0421**	4.7 (665.6)	2	3.2	13.0	3.0 (16.4)	2.9 (6.5)	96.5 (3.8)
SM2862-0951	**SM2862-0921**	4.7 (665.6)	4	0.85	3.4	3.0 (16.4)	2.9 (6.5)	96.5 (3.8)
SM2863-0451	**SM2863-0421**	6.7 (948.8)	2	4.0	17.0	4.5 (24.6)	4.0 (8.96)	127 (5)
SM2863-0951	**SM2863-0921**	6.7 (948.8)	4	0.9	4.2	4.5 (24.6)	4.0 (8.96)	127 (5)

Characteristics diagram

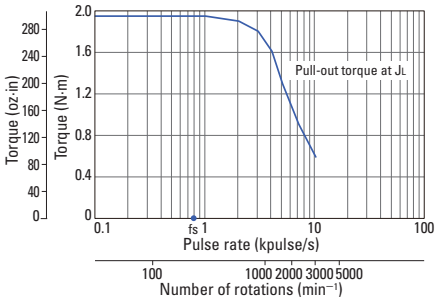
SH2861-0441
SH2861-0411
SM2861-0451
SM2861-0421

Constant current circuit
Source voltage: 100 VAC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10⁻⁴kg·m² (40.46 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



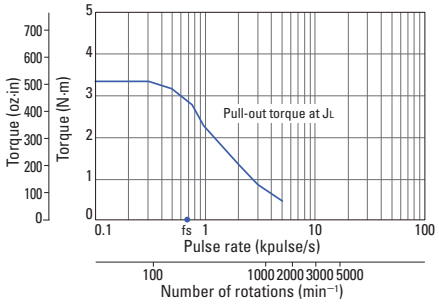
SH2861-0941
SH2861-0911
SM2861-0951
SM2861-0921

Constant current circuit
Source voltage: 100 VAC
Operating current:
4 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10⁻⁴kg·m² (40.46 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



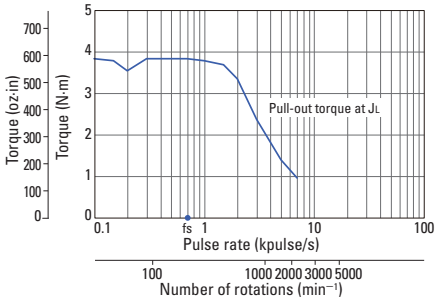
SH2862-0441
SH2862-0411
SM2862-0451
SM2862-0421

Constant current circuit
Source voltage: 100 VAC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[15.3 × 10⁻⁴kg·m² (83.65 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



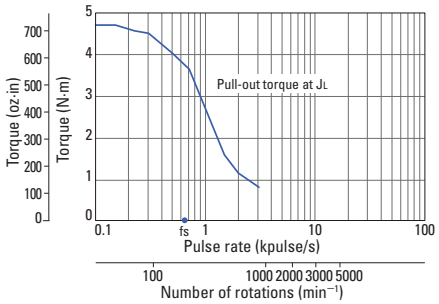
SH2862-0941
SH2862-0911
SM2862-0951
SM2862-0921

Constant current circuit
Source voltage: 100 VAC
Operating current:
4 A/phase, 2-phase energization (full-step)
J_L=[15.3 × 10⁻⁴kg·m² (83.65 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



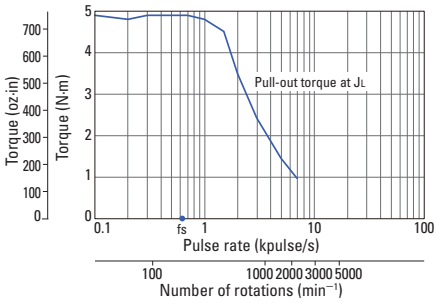
SH2863-0441
SH2863-0411
SM2863-0451
SM2863-0421

Constant current circuit
Source voltage: 100 VAC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[15.3 × 10⁻⁴kg·m² (83.65 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



SH2863-0941
SH2863-0911
SM2863-0951
SM2863-0921

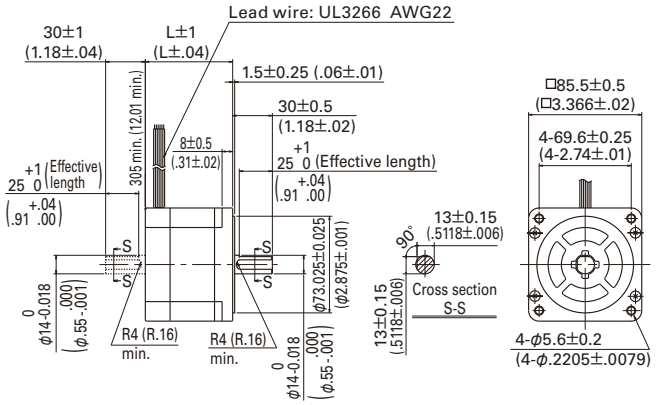
Constant current circuit
Source voltage: 100 VAC
Operating current:
4 A/phase, 2-phase energization (full-step)
J_L=[15.3 × 10⁻⁴kg·m² (83.65 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



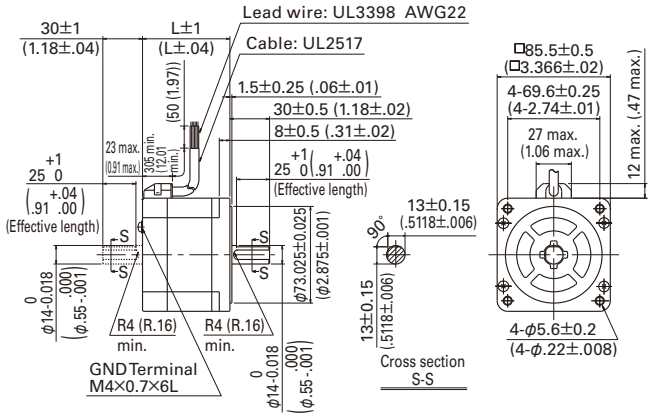
Allowable Load, Rotation Direction ▶p. 87 General Specifications ▶p. 88
Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Dimensions [Unit: mm (inch)]

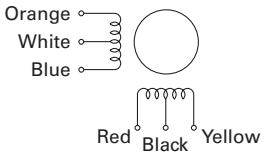
Lead wire type



Lead wire type CE/UL model



Internal wiring



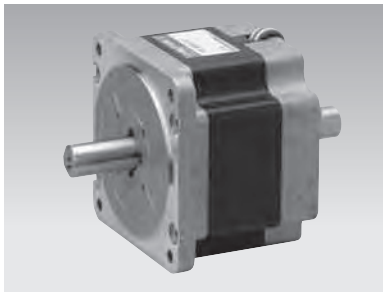
Compatible drivers

Driver is not included.

If you require assistance finding a driver, contact us for details.

Allowable Load, Rotation Direction▶p. 87 General Specifications▶p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.



86 mm sq. (3.39 inch sq.)

1.8˚ /step RoHS

Bipolar winding, Lead wire type
Bipolar winding, Lead wire type CE/UL model
Bipolar winding, Terminal block type CE/UL model
Unipolar winding, Lead wire type ▶p. 78
Unipolar winding, Lead wire type CE/UL model ▶p. 78

Customizing
Hollow | Shaft modification | Encoder
Varies depending on the model number and quantity. Contact us for details.

Bipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
SH2861-5041	**SH2861-5011**	3.3 (467.3)	2	2.2	15	1.48 (8.09)	1.75 (3.92)	66 (2.6)
SH2861-5141	**SH2861-5111**	3.3 (467.3)	4	0.56	3.7	1.48 (8.09)	1.75 (3.92)	66 (2.6)
SH2861-5241	**SH2861-5211**	3.3 (467.3)	6	0.29	1.7	1.48 (8.09)	1.75 (3.92)	66 (2.6)
SH2862-5041	**SH2862-5011**	6.4 (906.3)	2	3.2	25	3.0 (16.4)	2.9 (6.5)	96.5 (3.8)
SH2862-5141	**SH2862-5111**	6.4 (906.3)	4	0.83	6.4	3.0 (16.4)	2.9 (6.5)	96.5 (3.8)
SH2862-5241	**SH2862-5211**	6.4 (906.3)	6	0.36	2.8	3.0 (16.4)	2.9 (6.5)	96.5 (3.8)
SH2863-5041	**SH2863-5011**	9 (1274.4)	2	4.0	32	4.5 (24.6)	4.0 (8.96)	127 (5)
SH2863-5141	**SH2863-5111**	9 (1274.4)	4	1.0	7.9	4.5 (24.6)	4.0 (8.96)	127 (5)
SH2863-5241	**SH2863-5211**	9 (1274.4)	6	0.46	3.8	4.5 (24.6)	4.0 (8.96)	127 (5)

Bipolar winding, Lead wire type CE/UL model

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
SM2861-5051	**SM2861-5021**	3.3 (467.3)	2	2.2	15	1.48 (8.09)	1.75 (3.92)	66 (2.6)
SM2861-5151	**SM2861-5121**	3.3 (467.3)	4	0.56	3.7	1.48 (8.09)	1.75 (3.92)	66 (2.6)
SM2861-5251	**SM2861-5221**	3.3 (467.3)	6	0.29	1.7	1.48 (8.09)	1.75 (3.92)	66 (2.6)
SM2862-5051	**SM2862-5021**	6.4 (906.3)	2	3.2	25	3.0 (16.4)	2.9 (6.5)	96.5 (3.8)
SM2862-5151	**SM2862-5121**	6.4 (906.3)	4	0.83	6.4	3.0 (16.4)	2.9 (6.5)	96.5 (3.8)
SM2862-5251	**SM2862-5221**	6.4 (906.3)	6	0.36	2.8	3.0 (16.4)	2.9 (6.5)	96.5 (3.8)
SM2863-5051	**SM2863-5021**	9 (1274.4)	2	4.0	32	4.5 (24.6)	4.0 (8.96)	127 (5)
SM2863-5151	**SM2863-5121**	9 (1274.4)	4	1.0	7.9	4.5 (24.6)	4.0 (8.96)	127 (5)
SM2863-5251	**SM2863-5221**	9 (1274.4)	6	0.46	3.8	4.5 (24.6)	4.0 (8.96)	127 (5)

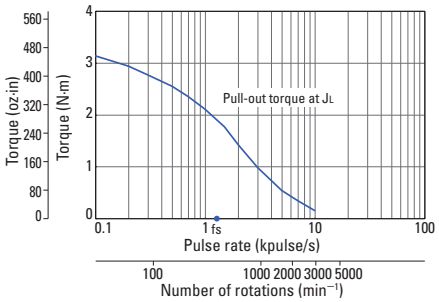
Bipolar winding, Terminal block type CE/UL model

Model number	Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
SM2861-5066	3.3 (467.3)	2	2.03	15	1.48 (8.09)	1.9 (4.19)	97.9 (3.9)
SM2861-5166	3.3 (467.3)	4	0.52	3.7	1.48 (8.09)	1.9 (4.19)	97.9 (3.9)
SM2861-5266	3.3 (467.3)	6	0.27	1.7	1.48 (8.09)	1.9 (4.19)	97.9 (3.9)
SM2862-5066	6.4 (906.3)	2	3.08	25	3.0 (16.4)	3.05 (6.72)	128.4 (5.1)
SM2862-5166	6.4 (906.3)	4	0.79	6.4	3.0 (16.4)	3.05 (6.72)	128.4 (5.1)
SM2862-5266	6.4 (906.3)	6	0.33	2.8	3.0 (16.4)	3.05 (6.72)	128.4 (5.1)
SM2863-5066	9 (1274.4)	2	3.83	32	4.5 (24.6)	4.15 (9.15)	158.8 (6.3)
SM2863-5166	9 (1274.4)	4	0.96	7.9	4.5 (24.6)	4.15 (9.15)	158.8 (6.3)
SM2863-5266	9 (1274.4)	6	0.48	3.8	4.5 (24.6)	4.15 (9.15)	158.8 (6.3)

Characteristics diagram

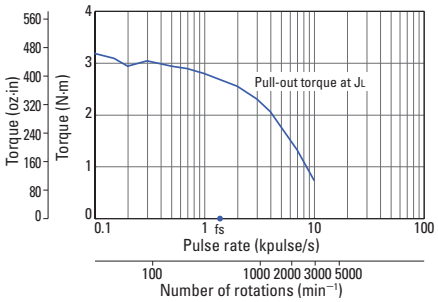
SH2861-5041
SH2861-5011
SM2861-5051
SM2861-5021
SM2861-5066

Constant current circuit
Source voltage: 100 VAC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[15.3 × 10⁻⁴kg·m² (83.65 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



SH2861-5141
SH2861-5111
SM2861-5151
SM2861-5121
SM2861-5166

Constant current circuit
Source voltage: 100 VAC
Operating current:
4 A/phase, 2-phase energization (full-step)
J_L=[15.3 × 10⁻⁴kg·m² (83.65 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

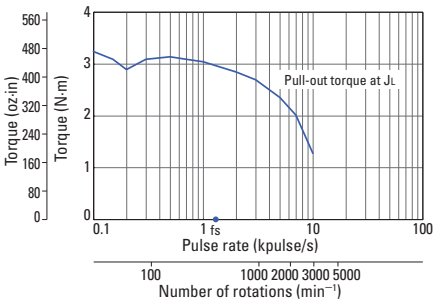


Allowable Load, Rotation Direction ▶p. 87 General Specifications ▶p. 88

Characteristics diagram

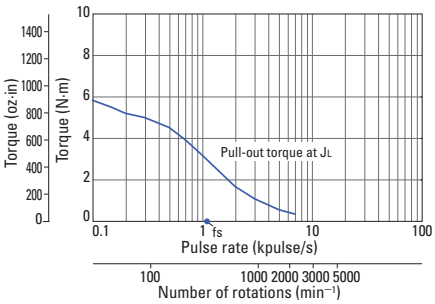
SH2861-5241
SH2861-5211
SM2861-5251
SM2861-5221
SM2861-5266

Constant current circuit
Source voltage: 100 VAC
Operating current:
6 A/phase, 2-phase energization (full-step)
J_L=[15.3 × 10^{-4}kg·m^2 (83.65 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



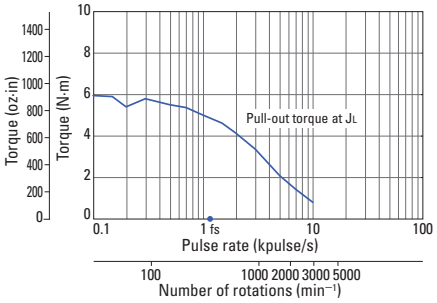
SH2862-5041
SH2862-5011
SM2862-5051
SM2862-5021
SM2862-5066

Constant current circuit
Source voltage: 100 VAC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[15.3 × 10^{-4}kg·m^2 (83.65 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



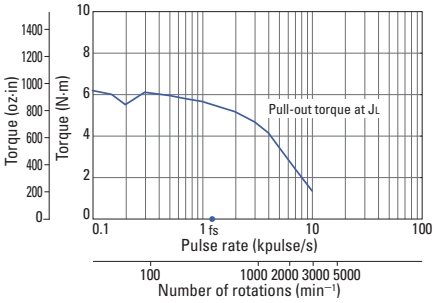
SH2862-5141
SH2862-5111
SM2862-5151
SM2862-5121
SM2862-5166

Constant current circuit
Source voltage: 100 VAC
Operating current:
4 A/phase, 2-phase energization (full-step)
J_L=[15.3 × 10^{-4}kg·m^2 (83.65 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



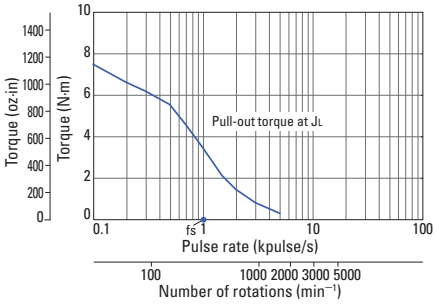
SH2862-5241
SH2862-5211
SM2862-5251
SM2862-5221
SM2862-5266

Constant current circuit
Source voltage: 100 VAC
Operating current:
6 A/phase, 2-phase energization (full-step)
J_L=[15.3 × 10^{-4}kg·m^2 (83.65 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



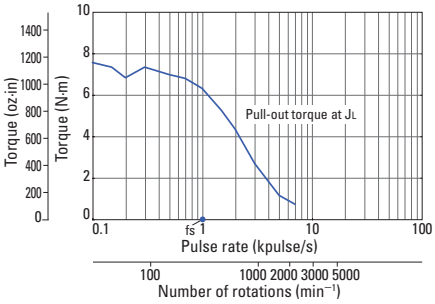
SH2863-5041
SH2863-5011
SM2863-5051
SM2863-5021
SM2863-5066

Constant current circuit
Source voltage: 100 VAC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[44 × 10^{-4}kg·m^2 (240.56 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



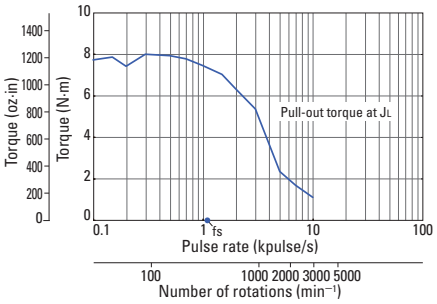
SH2863-5141
SH2863-5111
SM2863-5151
SM2863-5121
SM2863-5166

Constant current circuit
Source voltage: 100 VAC
Operating current:
4 A/phase, 2-phase energization (full-step)
J_L=[44 × 10^{-4}kg·m^2 (240.56 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



SH2863-5241
SH2863-5211
SM2863-5251
SM2863-5221
SM2863-5266

Constant current circuit
Source voltage: 100 VAC
Operating current:
6 A/phase, 2-phase energization (full-step)
J_L=[44 × 10^{-4}kg·m^2 (240.56 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

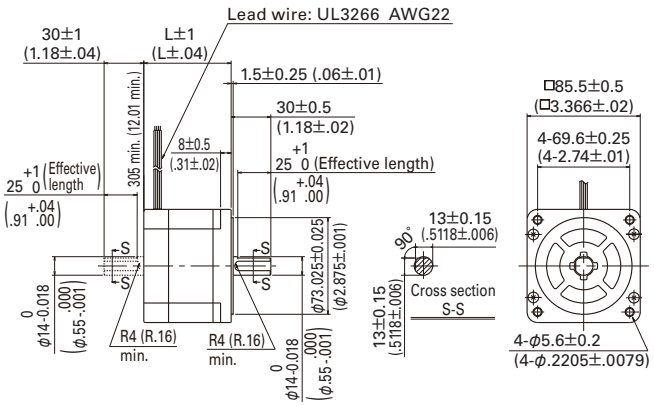


Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

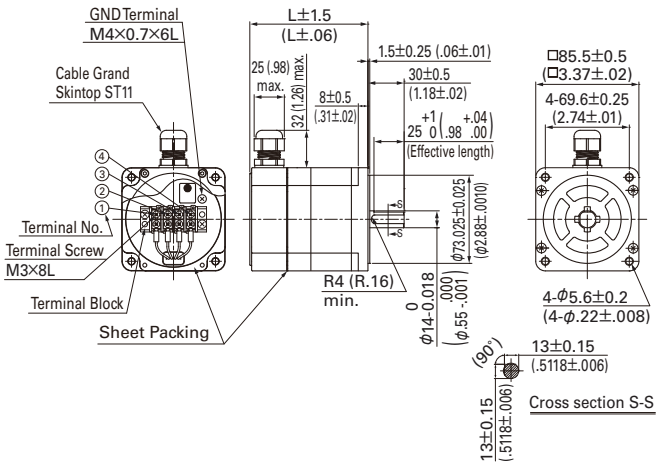
Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Dimensions [Unit: mm (inch)]

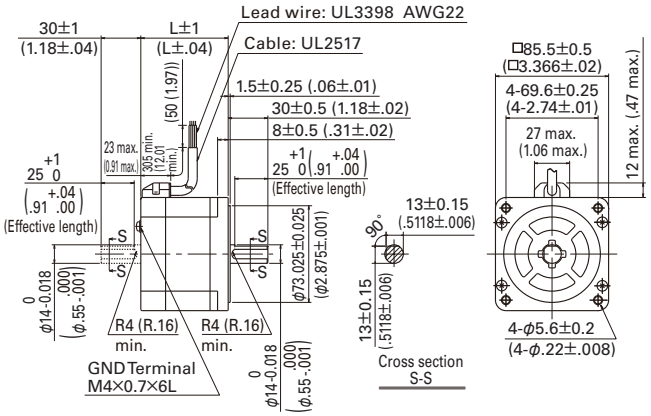
Lead wire type



Terminal block type CE/UL model

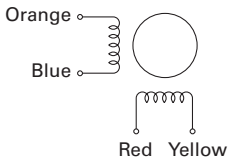


Lead wire type CE/UL model



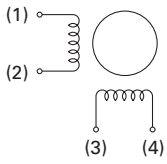
Internal wiring

Lead wire type



Terminal block type

( ) terminal block number



Compatible drivers

Driver is not included.

If you require assistance finding a driver, contact us for details.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

ϕ106 mm (ϕ4.17 inch)

1.8˚ /step RoHS

Unipolar winding, Lead wire type
Bipolar winding, Lead wire type

Customizing

Hollow | Shaft modification | Brake

Varies depending on the model number and quantity. Contact us for details.

Unipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H89222-0941	**103H89222-0911**	10.8 (1529.4)	4	0.98	6.3	14.6 (79.83)	7.5 (16.53)	163.3 (6.4)
103H89223-0941	**103H89223-0911**	15.5 (2194.9)	4	1.4	9.7	22 (120.28)	10.5 (23.15)	221.3 (8.7)

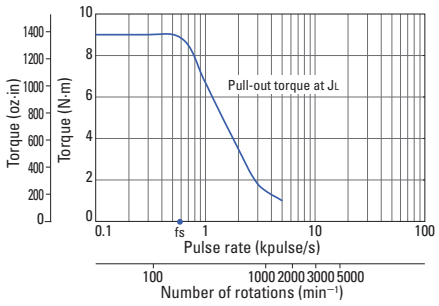
Bipolar winding, Lead wire type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H89222-5241	**103H89222-5211**	13.2 (1869.2)	6	0.45	5.4	14.6 (79.83)	7.5 (16.53)	163.3 (6.4)
103H89223-5241	**103H89223-5211**	19 (2690.5)	6	0.63	8	22 (120.28)	10.5 (23.15)	221.3 (8.7)

Characteristics diagram

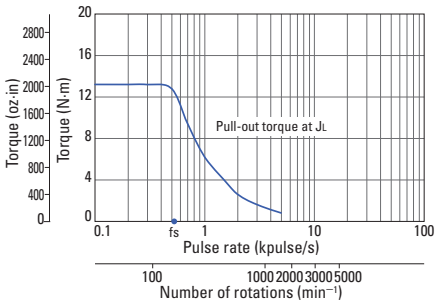
103H89222-0941
103H89222-0911

Constant current circuit
Source voltage: 100 VAC
Operating current:
4 A/phase, 2-phase energization (full-step)
JL=[44 × 10⁻⁴kg·m² (240.56 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



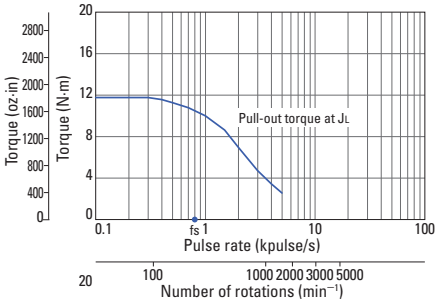
103H89223-0941
103H89223-0911

Constant current circuit
Source voltage: 100 VAC
Operating current:
4 A/phase, 2-phase energization (full-step)
JL=[44 × 10⁻⁴kg·m² (240.56 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



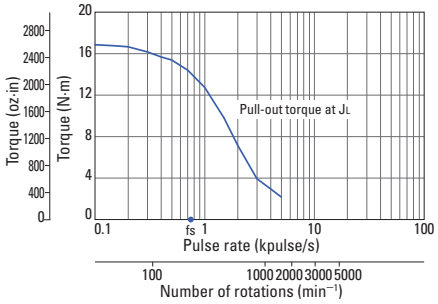
103H89222-5241
103H89222-5211

Constant current circuit
Source voltage: 100 VAC
Operating current:
6 A/phase, 2-phase energization (full-step)
JL=[44 × 10⁻⁴kg·m² (240.56 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

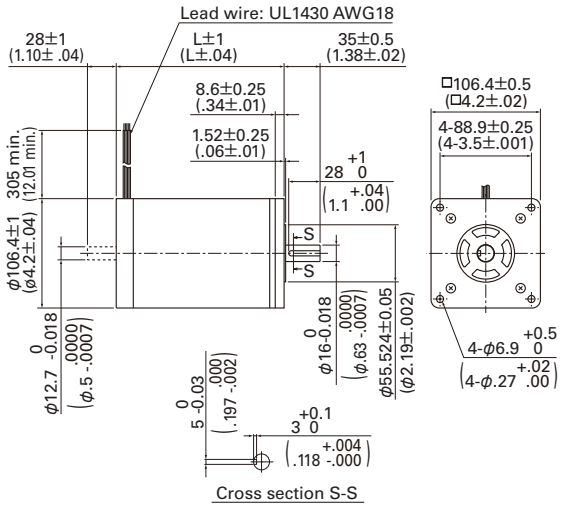


103H89223-5241
103H89223-5211

Constant current circuit
Source voltage: 100 VAC
Operating current:
6 A/phase, 2-phase energization (full-step)
JL=[44 × 10⁻⁴kg·m² (240.56 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

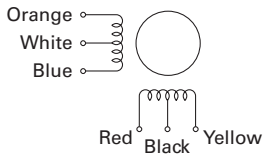


Dimensions [Unit: mm (inch)]

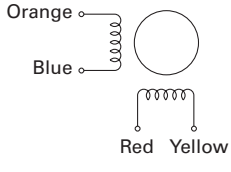


Internal wiring

Unipolar



Bipolar



Compatible drivers

Driver is not included.
If you require assistance finding a driver, contact us for details.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

56 mm sq. (2.20 inch sq.)

1.8˚ /step RoHS

Unipolar winding, Lead wire type CE model

Customizing

Hollow | Shaft modification

Varies depending on the model number and quantity. Contact us for details.

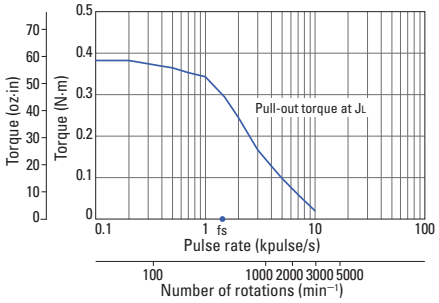
Unipolar winding, Lead wire type CE model

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H7121-6140	**103H7121-6110**	0.39 (55.2)	1	4.8	8	0.1 (0.55)	0.47 (1.04)	41.8 (1.65)
103H7121-6740	**103H7121-6710**	0.39 (55.2)	3	0.6	0.8	0.1 (0.55)	0.47 (1.04)	41.8 (1.65)
103H7123-6140	**103H7123-6110**	0.83 (117.5)	1	6.7	15	0.21 (1.15)	0.65 (1.43)	53.8 (2.12)
103H7123-6740	**103H7123-6710**	0.78 (110.5)	3	0.77	1.58	0.21 (1.15)	0.65 (1.43)	53.8 (2.12)
103H7126-6140	**103H7126-6110**	1.27 (179.8)	1	8.6	19	0.36 (1.97)	0.98 (2.16)	75.8 (2.98)
103H7126-6740	**103H7126-6710**	1.27 (179.8)	3	0.9	2.2	0.36 (1.97)	0.98 (2.16)	75.8 (2.98)

Characteristics diagram

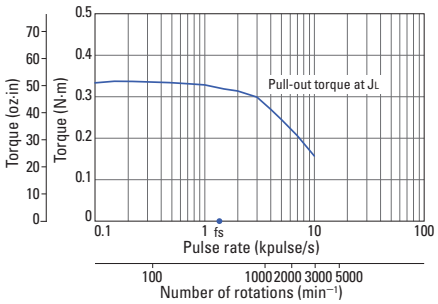
103H7121-6140 / 103H7121-6110

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



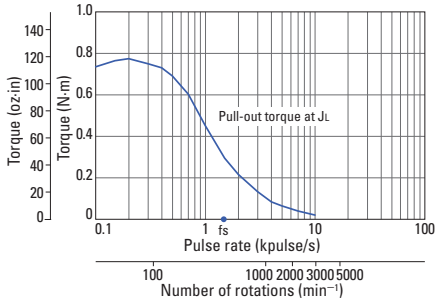
103H7121-6740 / 103H7121-6710

Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



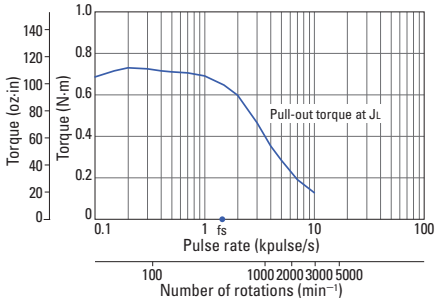
103H7123-6140 / 103H7123-6110

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



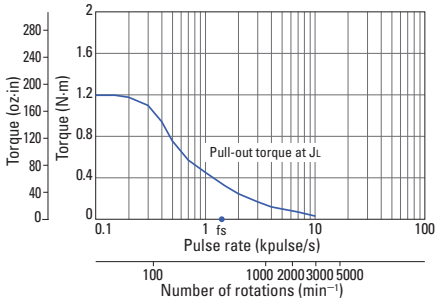
103H7123-6740 / 103H7123-6710

Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



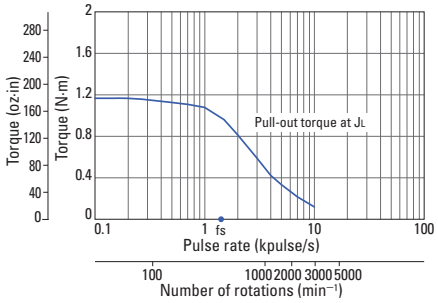
103H7126-6140 / 103H7126-6110

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

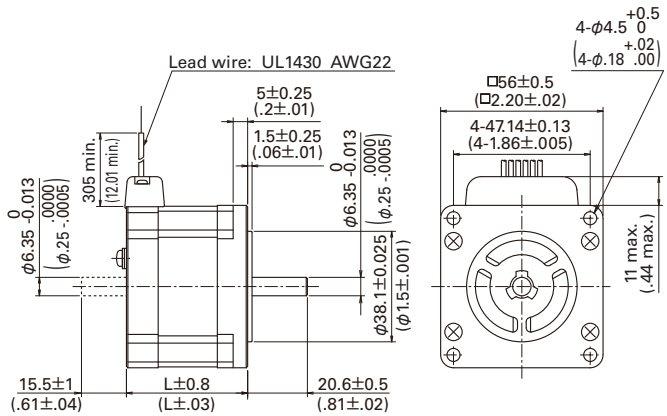


103H7126-6740 / 103H7126-6710

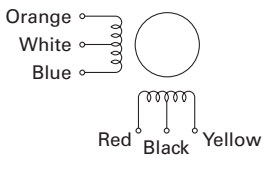
Constant current circuit
Source voltage: 24 VDC
Operating current:
3 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



Compatible drivers

- For motor model number 103H712 □ -67 □ 0 (3 A/phase)
  Driver is not included.
  If you require assistance finding a driver, contact us for details.
- For motors not listed above (1 A/phase)
  Model number: US1D200P10 (DC input)
  Operating current select switch setting: A

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

ϕ86 mm (ϕ3.39 inch)

1.8˚ /step RoHS

Bipolar winding, Lead wire type CE model

Customizing

Hollow | Shaft modification

Varies depending on the model number and quantity. Contact us for details.

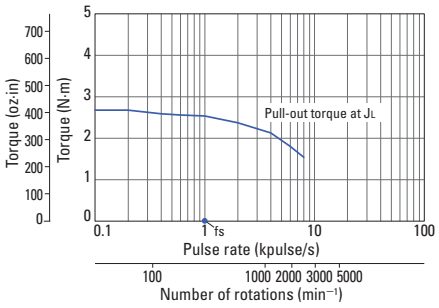
Bipolar winding, Lead wire type CE model

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H8221-6240	**103H8221-6210**	2.74 (388)	6	0.3	1.65	1.45 (7.93)	1.5 (3.31)	62 (3.31)
103H8222-6340	**103H8222-6310**	5.09 (720.8)	6	0.35	2.7	2.9 (15.86)	2.5 (5.51)	92.2 (5.51)
103H8223-6340	**103H8223-6310**	7.44 (1053.6)	6	0.45	3.4	4.4 (24.06)	3.5 (7.72)	125.9 (7.72)

Characteristics diagram

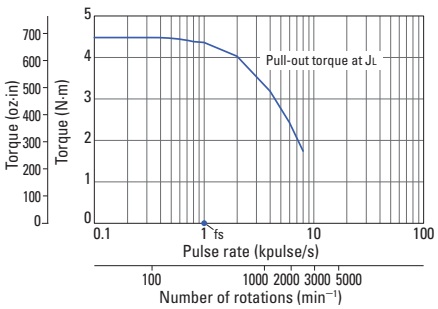
103H8221-6240
103H8221-6210

Constant current circuit
Source voltage: 100 VAC
Operating current:
6 A/phase, 2-phase energization (full-step)
JL=[7.4 × 10⁻⁴kg·m² (40.46 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



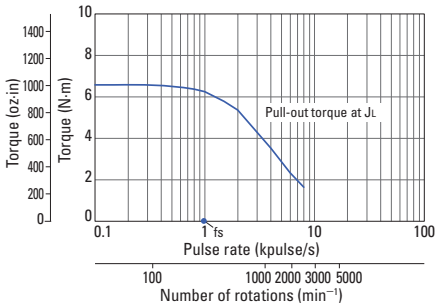
103H8222-6340
103H8222-6310

Constant current circuit
Source voltage: 100 VAC
Operating current:
6 A/phase, 2-phase energization (full-step)
JL=[15.3 × 10⁻⁴kg·m² (83.65 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

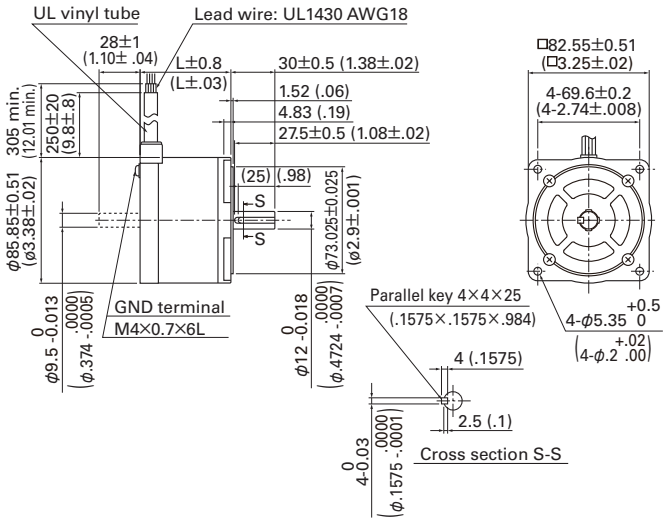


103H8223-6340
103H8223-6310

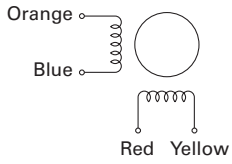
Constant current circuit
Source voltage: 100 VAC
Operating current:
6 A/phase, 2-phase energization (full-step)
JL=[44 × 10⁻⁴kg·m² (240.56 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



Compatible drivers

Driver is not included.

If you require assistance finding a driver, contact us for details.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

ϕ106 mm (ϕ4.17 inch)

1.8˚ /step RoHS

Bipolar winding, Lead wire type CE model

Customizing

Hollow | Shaft modification

Varies depending on the model number and quantity. Contact us for details.

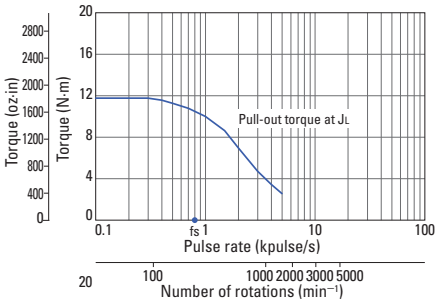
Bipolar winding, Lead wire type CE model

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H89222-6341	**103H89222-6311**	13.2 (1869.2)	6	0.45	5.4	14.6 (79.83)	7.5 (16.53)	163.3 (6.4)
103H89223-6341	**103H89223-6311**	19 (2690.5)	6	0.63	8	22 (120.28)	10.5 (23.15)	221.3 (8.7)

Characteristics diagram

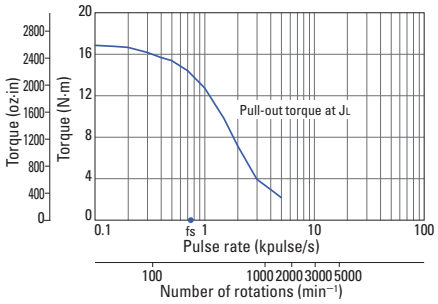
103H89222-6341
103H89222-6311

Constant current circuit
Source voltage: 100 VAC
Operating current:
6 A/phase, 2-phase energization (full-step)
JL=[44 × 10⁻⁴kg·m² (240.56 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

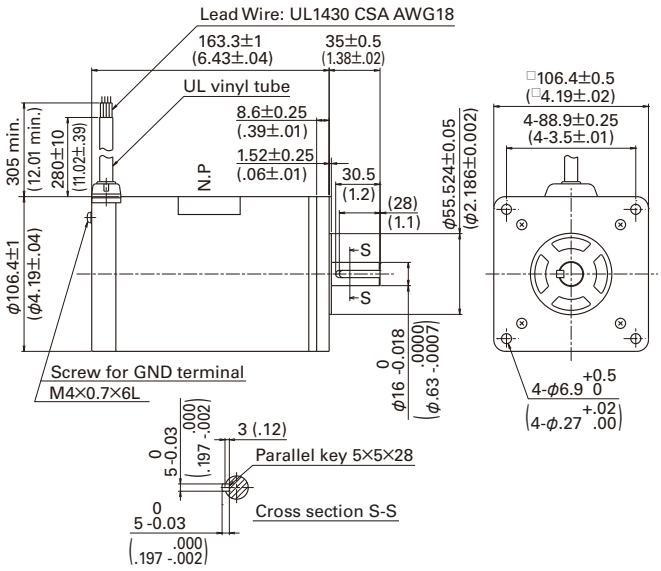


103H89223-6341
103H89223-6311

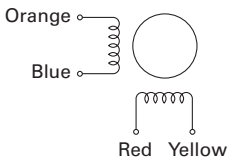
Constant current circuit
Source voltage: 100 VAC
Operating current:
6 A/phase, 2-phase energization (full-step)
JL=[44 × 10⁻⁴kg·m² (240.56 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



Dimensions [Unit: mm (inch)]



Internal wiring



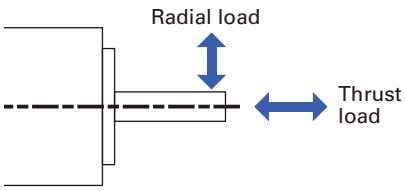
Compatible drivers

Driver is not included.
If you require assistance finding a driver, contact us for details.

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Allowable Radial/Thrust Load



Flange size	Model number	Distance from end of shaft : mm (in)				Thrust load N (lbs)
		0	5	10	15	
		Radial load : N (lbs)				
14 mm sq. (0.55 in sq.)	SH2141	10 (2.25)	11 (2.47)	13 (2.92)	-	0.7 (0.16)
28 mm sq. (1.10 in sq.)	SH228 □	42 (9)	48 (10)	56 (12)	66 (14)	3 (0.67)
35 mm sq. (1.38 in sq.)	SH353 □	40 (8)	50 (11)	67 (15)	98 (22)	10 (2.25)
42 mm sq. (1.65 in sq.)	103H52 □□ SH142 □	22 (4)	26 (5)	33 (7)	46 (10)	10 (2.25)
50 mm sq. (1.97 in sq.)	103H670 □	71 (15)	87 (19)	115 (25)	167 (37)	15 (3.37)
56 mm sq. (2.20 in sq.)	103H712 □	52 (11)	65 (14)	85 (19)	123 (27)	15 (3.37)
	103H7128	85 (19)	105 (23)	138 (31)	200 (44)	15 (3.37)
60 mm sq. (2.36 in sq.)	103H782 □	70 (15)	87 (19)	114 (25)	165 (37)	20 (4.50)
	SH160 □					15 (3.37)
86 mm sq. (3.39 in sq.)	SM286 □ SH286 □	167 (37)	193 (43)	229 (51)	280 (62)	60 (13.488)
86 mm sq. (3.39 in sq.)	103H822 □	191 (43)	234 (53)	301 (68)	421 (95)	60 (13.488)
ϕ106 mm (ϕ4.17 in)	103H8922 □	321 (72)	356 (79)	401 (90)	457 (101)	100 (22.48)

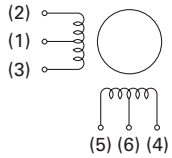
Internal Wiring and Rotation Direction

Unipolar winding

Connector type Model number: 103H52 □□

Internal wire connection

( ) connector pin number



Direction of motor rotation

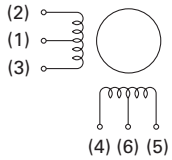
When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

		Connector pin number				
		(1.6)	(5)	(3)	(4)	(2)
Exciting order	1	+	–	–		
	2	+		–	–	
	3	+			–	–
	4	+	–			–

Connector type Model number: 103H782 □□

Internal wire connection

( ) connector pin number



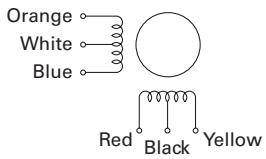
Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

		Connector pin number				
		(1.6)	(4)	(3)	(5)	(2)
Exciting order	1	+	–	–		
	2	+		–	–	
	3	+			–	–
	4	+	–			–

Lead wire type

Internal wire connection



Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

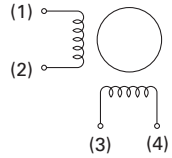
		Lead wire color				
		White & black	Red	Blue	Yellow	Orange
Exciting order	1	+	–	–		
	2	+		–	–	
	3	+			–	–
	4	+	–			–

Bipolar winding

Connector type

Internal wire connection

( ) connector pin number, terminal block number



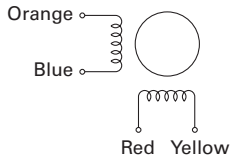
Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

		Connector pin number, terminal block number			
		(3)	(2)	(4)	(1)
Exciting order	1	–	–	+	+
	2	+	–	–	+
	3	+	+	–	–
	4	–	+	+	–

Lead wire type

Internal wire connection



Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

		Lead wire color			
		Red	Blue	Yellow	Orange
Exciting order	1	–	–	+	+
	2	+	–	–	+
	3	+	+	–	–
	4	–	+	+	–

General Specifications

Motor model number	SH2141	SH228 □	SH353 □	SS242 □	SH142 □	103H52 □□	SS250 □	103H67 □□	103H712 □
Type	—								
Operating ambient temperature	− 10℃ to + 50℃								
Conversation temperature	− 20℃ to + 65℃								
Operating ambient humidity	20 to 90% RH (no condensation)								
Conversation humidity	5 to 95% RH (no condensation)								
Operation altitude	1000 m (3281 feet) max. above sea level								
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 150 m/s² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.								
Impact resistance	500 m/s² of acceleration for 11 ms with half-sine wave applying three times for X, Y, and Z axes each, 18 times in total.								
Insulation class	Class B (+130℃)								
Withstandable voltage	At normal temperature and humidity, no failure with 500 VAC @50/60 Hz applied for one minute between motor winding and frame.							At normal temperature and humidity, no failure with 1000 VAC @50/60 Hz applied for one minute between motor winding and frame.	
Insulation resistance	At normal temperature and humidity, not less than 100 MΩ between winding and frame by 500 VDC megger.								
Protection grade	IP40								
Winding temperature rise	80 K max. (Based on Sanyo Denki standard)								
Static angle error	± 0.09˚				± 0.054˚	± 0.09˚			
Thrust play *1	0.075 mm (0.003 in) max. (load: 0.35 N (0.08 lbs))	0.075 mm (0.003 in) max. (load: 1.5 N (0.34 lbs))	0.075 mm (0.003 in) max. (load: 5 N (1.12 lbs))	0.075 mm (0.003 in) max. (load: 4 N (0.9 lbs))	0.075 mm (0.003 in) max. (load: 5 N (1.12 lbs))	0.075 mm (0.003 in) (load: 5 N (1.12 lbs))	0.075 mm (0.003 in) max. (load: 4 N (0.9 lbs))	0.075 mm (0.003 in) (load: 10 N (2.25 lbs))	0.075 mm (0.003 in) (load: 10 N (2.25 lbs))
Radial play *2	0.025 mm (0.001 in) max. (load: 5 N (1.12 lbs))								
Shaft runout	0.025 mm (0.001 in)								
Concentricity of mounting pilot relative to shaft	ϕ 0.05 mm (ϕ 0.002 in)	ϕ 0.05 mm (ϕ 0.002 in)	ϕ 0.075 mm (ϕ 0.003 in)	ϕ 0.075 mm (ϕ 0.003 in)	ϕ 0.05 mm (ϕ 0.002 in)	ϕ 0.05 mm (ϕ 0.002 in)	ϕ 0.075 mm (ϕ 0.003 in)	ϕ 0.075 mm (ϕ 0.003 in)	ϕ 0.075 mm (ϕ 0.003 in)
Squareness of mounting surface relative to shaft	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.075 mm (0.003 in)	0.075 mm (0.003 in)
Direction of motor mounting	Can be freely mounted vertically or horizontally								

Motor model number	SH160 □	103H78 □□	SH286 □	103H8922 □	SM286 □	103H712 □ -6 □□ 0 CE Model	103H822 □ -6 □□ 0 CE Model	103H8922 □ -63 □ 1 CE Model
Type	—				S1 (continuous operation)			
Operating ambient temperature	− 10℃ to + 50℃				− 10℃ to + 40℃			
Conversation temperature	− 20℃ to + 65℃				− 20℃ to + 60℃			
Operating ambient humidity	20 to 90% RH (no condensation)				95% max.: 40℃ max., 57% max.: 50℃ max., 35% max.: 60℃ max. (no condensation)			
Conversation humidity	5 to 95% RH (no condensation)							
Operation altitude	1000 m (3280 feet) max. above sea level							
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 150 m/s² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.							
Impact resistance	500 m/s² of acceleration for 11 ms with half-sine wave applying three times for X, Y and Z axes each, 18 times in total.							
Insulation class	Class B (+130℃)				Class F (+155℃)	Class B (+130℃)		
Withstandable voltage	At normal temperature and humidity, no failure with 1000 VAC @50/60 Hz applied for one minute between motor winding and frame.			At normal temperature and humidity, no failure with 1500 VAC @50/60 Hz applied for one minute between motor winding and frame.				
Insulation resistance	At normal temperature and humidity, not less then 100 MΩ between winding and frame by 500 VDC megger.							
Protection grade	IP40				IP43			
Winding temperature rise	80 K max. (Based on Sanyo Denki standard)							
Static angle error	± 0.054˚	± 0.09˚						
Thrust play *1	0.075 mm (0.003 in) max. (load: 10 N (2.25 lbs))							
Radial play *2	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 10 N (2.25 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 10 N (2.25 lbs))
Shaft runout	0.025 mm (0.001 in)							
Concentricity of mounting pilot relative to shaft	ϕ 0.075 mm (ϕ 0.003 in)							
Squareness of mounting surface relative to shaft	0.1 mm (0.004 in)	0.075 mm (0.003 in)	0.15 mm (0.006 in)	0.1 mm (0.004 in)	0.15 mm (0.006 in)	0.075 mm (0.003 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)
Direction of motor mounting	Can be freely mounted vertically or horizontally							

*1 Thrust play: Shaft displacement under axial load.
*2 Radial play: Shaft displacement under radial load applied 1/3rd of the length from the end of the shaft.

Safety standards

Model Number: SM286 □ CE/UL marked models

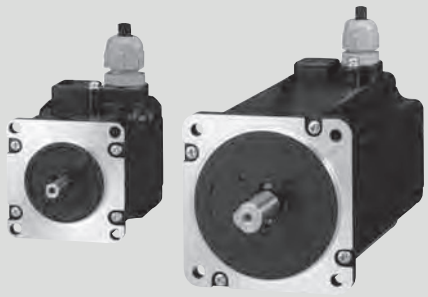
CE (TÜV)	Standard category		Applicable standard
	Low-voltage directives		EN60034-1, EN60034-5
UL	Acquired standards	Applicable standard	File No.
	UL	UL1004-1, UL1004-6	E179832
	UL for Canada	CSA C22.2 No.100	

Model Number: 103H712 □ -6 □□ 0, 103H822 □ -6 □□ 0, 103H8922 □ -63 □ 1 CE marked model

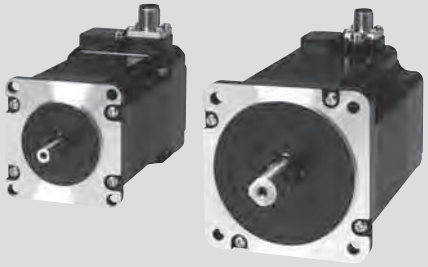
CE (TÜV)	Standard category	Applicable standard
	Low-voltage directives	EN60034-1, EN60034-5

IP65 Splash and Dust Proof Stepping Motors

Waterproof, dustproof



Cable type



Connector type

Features

- These IP65 rated motors* have superior water and dust resistance, and can be safely utilized in harsh or wet environments such as in food processing machines.
  *Except for the shaft and the cable end.
- The input voltage range of the motors is up to 250 VAC.
- Brake, encoder, and oil seal can be combined.

Safety standards

CE/UL-certified.

Specifications

	56 mm sq. (2.20 in sq.)	86 mm sq. (3.39 in sq.)
Motor model number	SP256 □ -5 □ 60	SP286 □ -5 □ 60
Type	S1 (continuous operation)	
Operating ambient temperature	− 10℃ to + 40℃	
Conversation temperature	− 20℃ to + 60℃	
Operating ambient humidity	95% max.: 40℃ max., 57% max.: 50℃ max. 35% max.: 60℃ max. (no condensation)	
Conversation humidity		
Operation altitude	1000 m (3281 feet) max. above sea level	
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 150 m/s² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.	
Impact resistance	500 m/s² of acceleration for 11 ms with half-sine wave applying three times for X, Y and Z axes each, 18 times in total.	
Insulation class	Class F (+155℃)	
Withstandable voltage	At normal temperature and humidity, no failure with 1500 VAC @50/60 Hz applied for one minute between motor winding and frame.	
Insulation resistance	At normal temperature and humidity, not less than 100 MΩ between winding and frame by 500 VDC megger.	
Protection grade	IP65 (Except for the shaft and the cable end)	
Winding temperature rise	100 K max. (Based on Sanyo Denki standard)	
Static angle error	± 0.054°	± 0.09°
Thrust play	0.075 mm (0.003 in) max. (load: 10 N (2.25 lbs))	
Radial play	0.025 mm (0.001 in) max. (load: 5 N (1.12 lbs))	
Shaft runout	0.025 mm (0.001 in)	
Concentricity of mounting pilot relative to shaft	ϕ 0.075 mm (ϕ 0.003 in)	
Squareness of mounting surface relative to shaft	0.1 mm (0.004 in)	0.15 mm (0.006 in)
Direction of motor mounting	Can be freely mounted vertically or horizontally	

Safety standards

CE	Standard category	Applicable standard	
	Low-voltage directives	EN60034-1, EN60034-5	
UL	Acquired standards	Applicable standard	File No.
	UL	UL1004-1, UL1004-6	E179832
	UL for Canada (c-UL)	CSA C22.2 No.100	

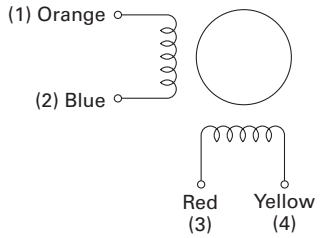
Model no. differs when the motor is equipped with a brake or oil seal.
Model no. and vibration resistence levels differ when the motor is equipped with a brake or oil seal.

Internal wiring and rotation direction

Bipolar winding

Internal wire connection

( ): connector pin number



Direction of motor rotation

The output shaft rotates clockwise as seen from the shaft side, when excited by DC in the following order.

Lead wire color		Red	Blue	Yellow	Orange
Connector pin number		3	2	4	1
Exciting order	1	−	−	+	+
	2	+	−	−	+
	3	+	+	−	−
	4	−	+	+	−

56 mm sq. (2.20 inch sq.)

1.8° /step RoHS

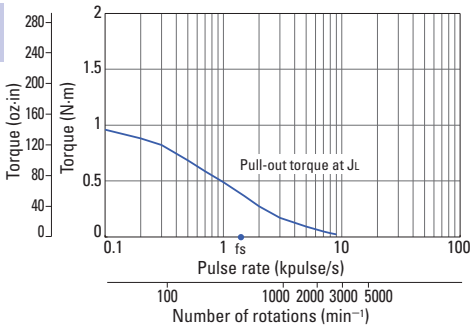
Bipolar winding

Model number		Holding torque at 2-phase energization	Rated current	Winding resistance	Winding inductance	Rotor inertia	Mass (Weight)	Allowable thrust load	Allowable radial load
Cable type	Connector type	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	N (lbs)	N (lbs)
SP2563-5060	**SP2563-5000**	1 (141.6)	1	5.8	29	0.21 (1.15)	0.9 (2)	15 (3.37)	52 (11.69)
SP2563-5160	**SP2563-5100**	1 (141.6)	2	1.5	7.3	0.21 (1.15)	0.9 (2)	15 (3.37)	52 (11.69)
SP2563-5260	**SP2563-5200**	1 (141.6)	3	0.75	3.4	0.21 (1.15)	0.9 (2)	15 (3.37)	52 (11.69)
SP2566-5060	**SP2566-5000**	1.7 (240.7)	1	7.8	35.4	0.36 (1.97)	1.2 (2.65)	15 (3.37)	23 (5.17)
SP2566-5160	**SP2566-5100**	1.7 (240.7)	2	2	9.2	0.36 (1.97)	1.2 (2.65)	15 (3.37)	23 (5.17)
SP2566-5260	**SP2566-5200**	1.7 (240.7)	3	1	4.4	0.36 (1.97)	1.2 (2.65)	15 (3.37)	23 (5.17)

・The model no., rotor inertia and mass differ when the motor is equipped with brake, encoder or oil seal.

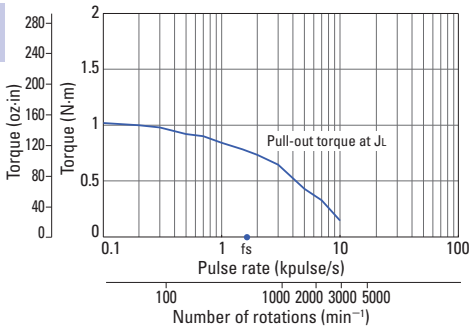
Characteristics diagram

SP2563-5000
SP2563-5060



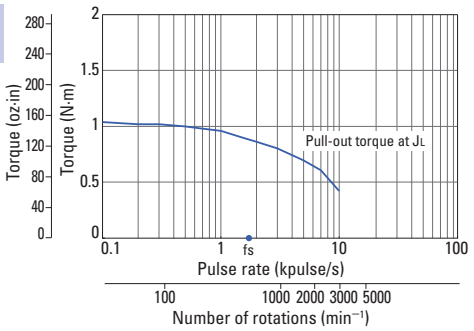
Constant current circuit
Source voltage: 100 VAC
Operating current: 1 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2563-5100
SP2563-5160



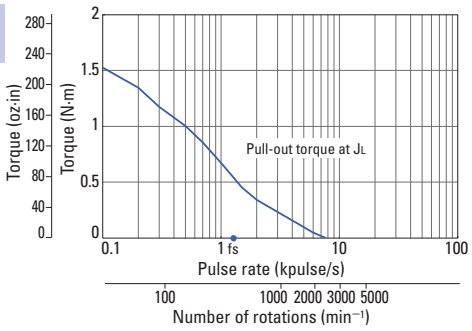
Constant current circuit
Source voltage: 100 VAC
Operating current: 2 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2563-5200
SP2563-5260



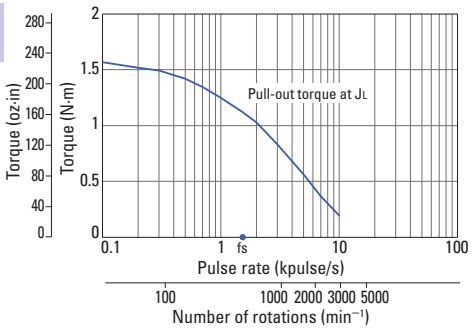
Constant current circuit
Source voltage: 100 VAC
Operating current: 3 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2566-5000
SP2566-5060



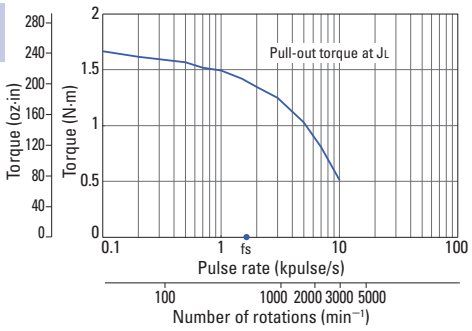
Constant current circuit
Source voltage: 100 VAC
Operating current: 1 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10⁻⁴kg·m² (40.46 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2566-5100
SP2566-5160



Constant current circuit
Source voltage: 100 VAC
Operating current: 2 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10⁻⁴kg·m² (40.46 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2566-5200
SP2566-5260



Constant current circuit
Source voltage: 100 VAC
Operating current: 3 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10⁻⁴kg·m² (40.46 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

86 mm sq. (3.39 inch sq.)

1.8° /step RoHS

Bipolar winding

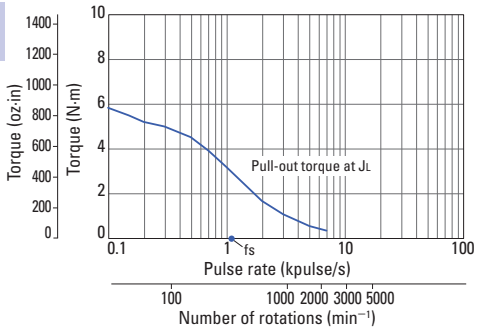
Model number		Holding torque at 2-phase energization	Rated current	Winding resistance	Winding inductance	Rotor inertia	Mass (Weight)	Allowable thrust load	Allowable radial load
Cable type	Connector type	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	N (lbs)	N (lbs)
SP2862-5060	**SP2862-5000**	6.4 (906.3)	2	3.2	25	3 (16.4)	3.1 (6.8)	60 (13.49)	200 (44.96)
SP2862-5160	**SP2862-5100**	6.4 (906.3)	4	0.85	6.4	3 (16.4)	3.1 (6.8)	60 (13.49)	200 (44.96)
SP2862-5260	—	6.4 (906.3)	6	0.41	2.8	3 (16.4)	3.1 (6.8)	60 (13.49)	200 (44.96)
SP2863-5060	**SP2863-5000**	9 (1274.5)	2	4	32	4.5 (24.6)	4.2 (9.3)	60 (13.49)	200 (44.96)
SP2863-5160	**SP2863-5100**	9 (1274.5)	4	1.05	7.9	4.5 (24.6)	4.2 (9.3)	60 (13.49)	200 (44.96)
SP2863-5260	—	9 (1274.5)	6	0.53	3.8	4.5 (24.6)	4.2 (9.3)	60 (13.49)	200 (44.96)

・The model no., rotor inertia and mass differ when the motor is equipped with brake, encoder or oil seal.

・The rated current of the motor with the connector is 4 A or less.

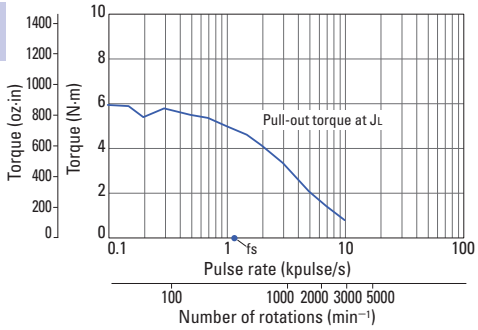
Characteristics diagram

SP2862-5000
SP2862-5060



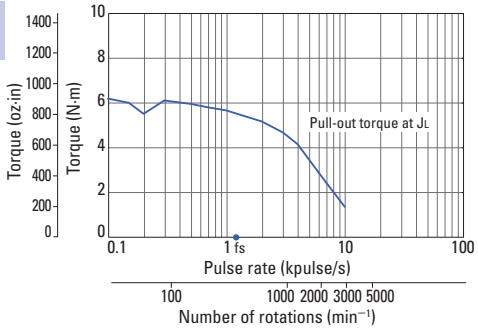
Constant current circuit
Source voltage: 100 VAC
Operating current: 2 A/phase, 2-phase energization (full-step)
JL=[15.3 × 10⁻⁴kg·m² (83.65 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2862-5100
SP2862-5160



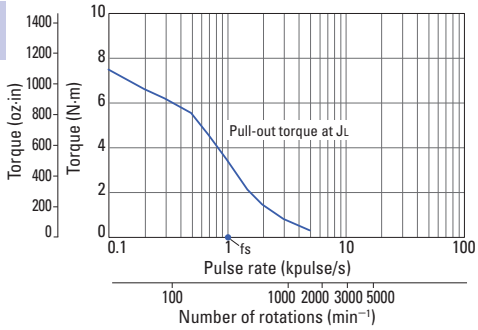
Constant current circuit
Source voltage: 100 VAC
Operating current: 4 A/phase, 2-phase energization (full-step)
JL=[15.3 × 10⁻⁴kg·m² (83.65 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2862-5260



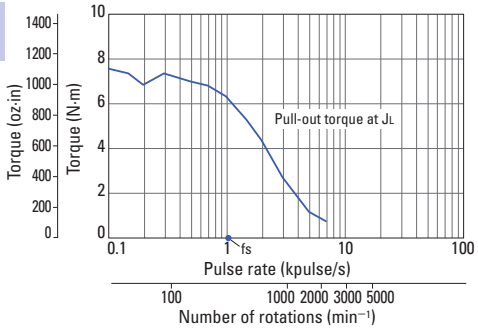
Constant current circuit
Source voltage: 100 VAC
Operating current: 6 A/phase, 2-phase energization (full-step)
JL=[15.3 × 10⁻⁴kg·m² (83.65 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2863-5000
SP2863-5060



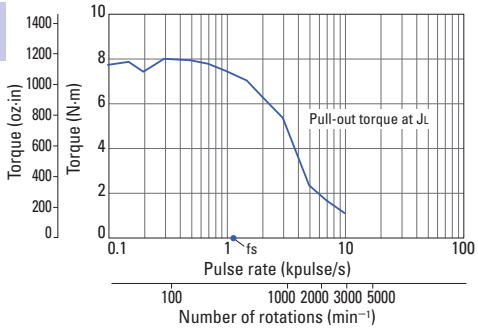
Constant current circuit
Source voltage: 100 VAC
Operating current: 2 A/phase, 2-phase energization (full-step)
JL=[44 × 10⁻⁴kg·m² (240.56 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2863-5100
SP2863-5160



Constant current circuit
Source voltage: 100 VAC
Operating current: 4 A/phase, 2-phase energization (full-step)
JL=[44 × 10⁻⁴kg·m² (240.56 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2863-5260

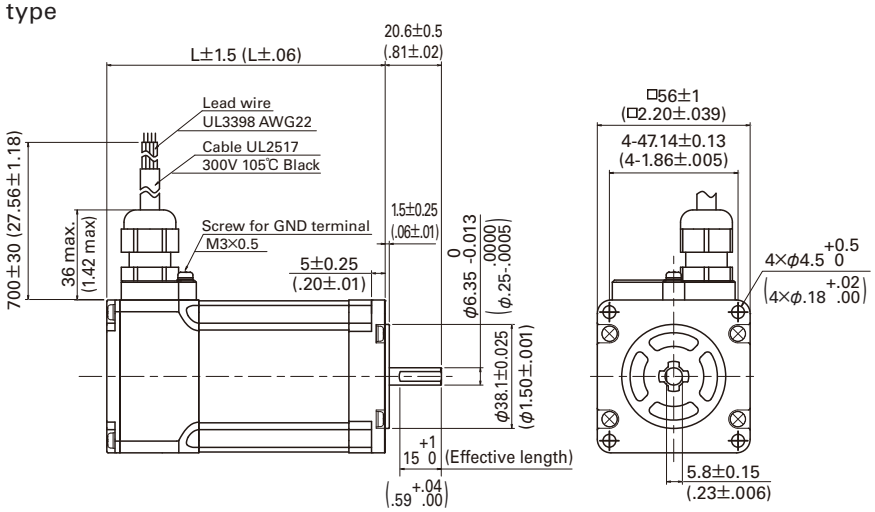


Constant current circuit
Source voltage: 100 VAC
Operating current: 6 A/phase, 2-phase energization (full-step)
JL=[44 × 10⁻⁴kg·m² (240.56 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

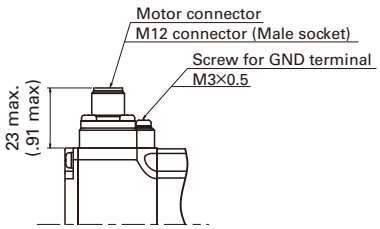
Dimensions [Unit: mm (inch)]

56 mm sq. (2.20 inch sq.)

Cable type



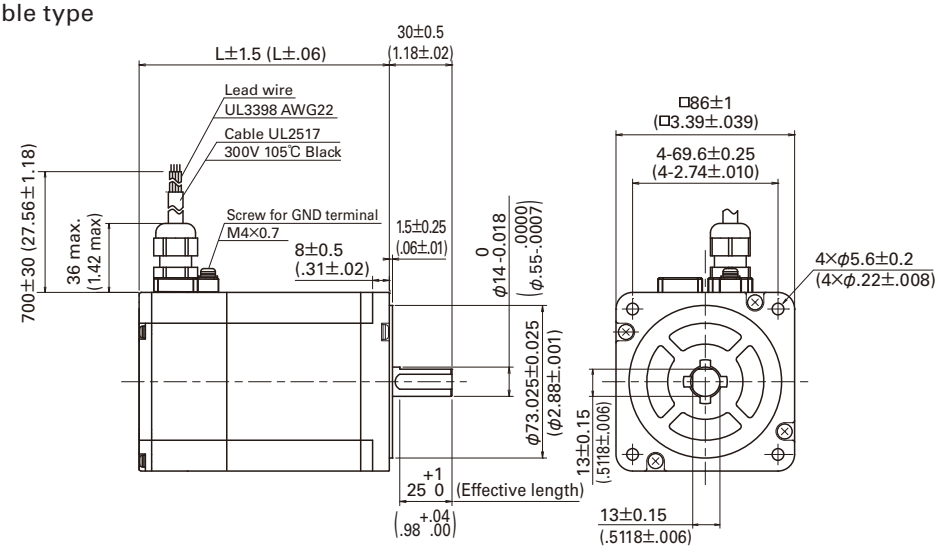
Connector type



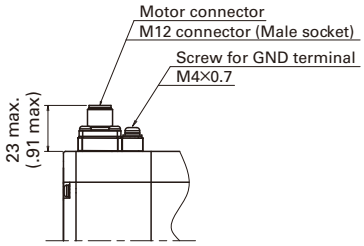
Model number		Motor length (L)
Cable type	Connector type	
SP2563-5 □ 60	SP2563-5 □ 00	80 (3.15)
SP2566-5 □ 60	SP2563-5 □ 00	102 (4.02)

86 mm sq. (3.39 inch sq.)

Cable type

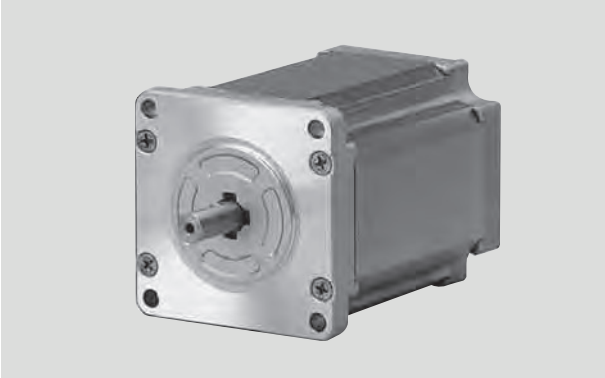


Connector type



Model number		Motor length (L)
Cable type	Connector type	
SP2862-5 □ 60	SP2862-5 □ 00	120 (4.72)
SP2863-5 □ 60	SP2862-5 □ 00	150 (5.91)

Stepping Motors for Vacuum Environments Customized Products



Features

- These stepping motors can be driven in a vacuum environment without requiring a vacuum feedthrough. Use as vacuum-compatible actuators while retaining the stepping motor benefits of easy high-precision open-loop control.
- We can customize for a wide range of environment pressures, from low to ultra-high vacuums.
- Available baked at 200℃.
- Size is similar to that of typical stepping motors.

Intended operating pressure

Low vacuum			Medium vacuum			High vacuum				Ultra-High vacuum				
10^5	10^4	10^3	10^2	10^1	1	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	10^{-8}	[Pa]

Applications

Ideal for the following applications. Contact us to discuss your particular application environment needs.

- Semiconductor manufacturing equipment
- Satellite robotics
- Electron microscopes
- Large-scale research facilities such as accelerators, synchrotron radiation analysis equipment, etc.

Motor size

42 mm sq. (1.65 inch sq.) to ϕ 106 mm (ϕ 4.17 inch)

Synchronous Motors Customized Products

Features

- These motors always maintain a constant speed under variable load and voltage conditions, rotating in step with the frequency of the power supply. This eliminates motor slip.
- Provides high torque at ultraslow speeds with gearless construction.
- Allows for simplification by connecting directly to the commercial (AC) power supply, eliminating the need for a driver circuit.

Applications

Ideal for the following applications. Contact us to discuss your particular application environment needs.

- Conveyor drives
- Printers
- Cryopumps
- Cryocoolers
- Switchgears

Motor size

56 mm sq. (2.20 inch sq.) to ϕ 106 mm (ϕ 4.17 inch)

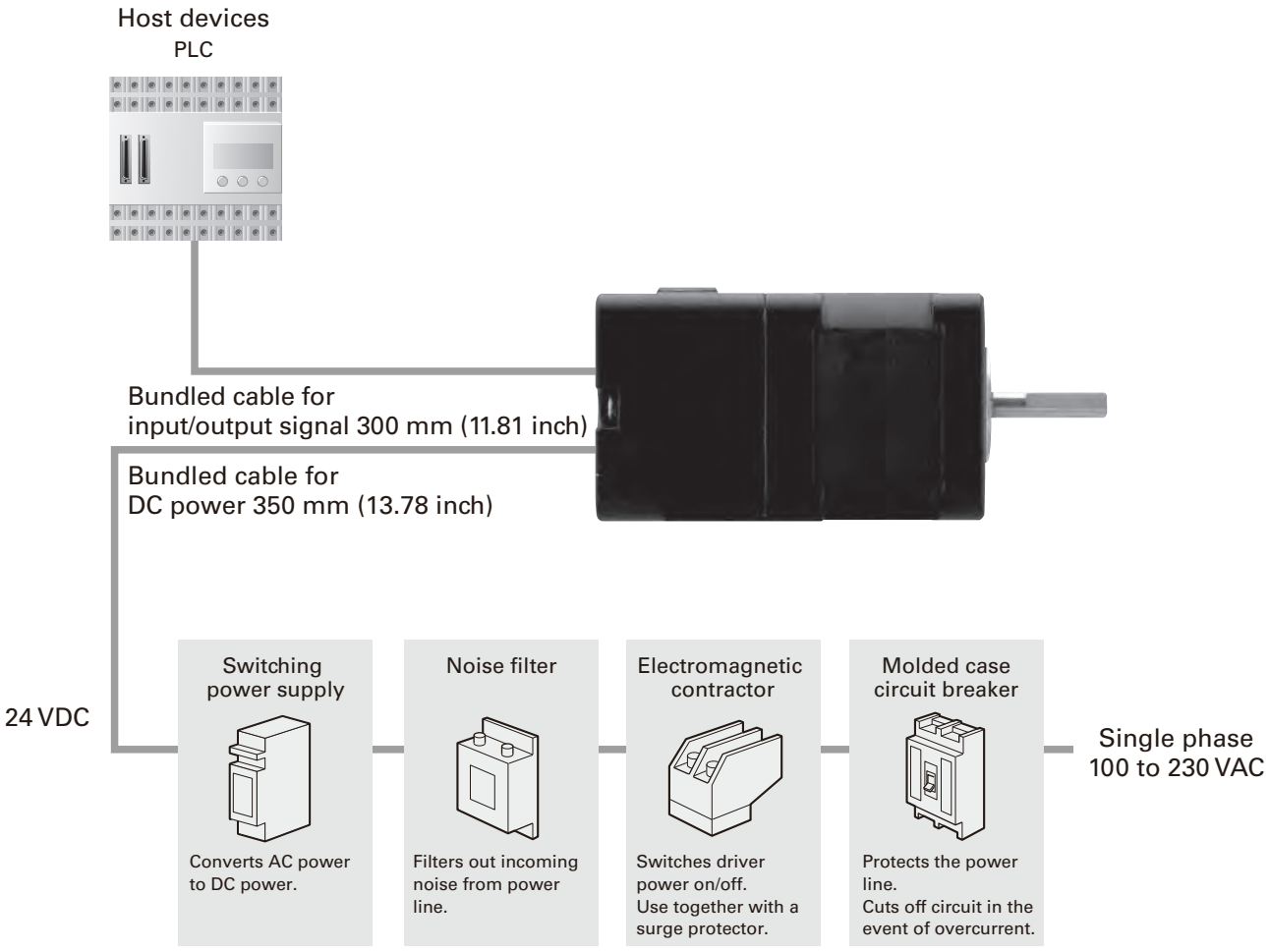
Stepping Motors with Integrated Drivers

Features

1. Driver and motor are now integrated into a single unit.
   A driver incorporating a motion control function needed for driving a motor and a 2-phase stepping motor were integrated into a single unit, enabling a more compact installation space and less wiring.

2. Three types of operation modes can be selected to match the specific application.
   (1) Pulse train interface mode:
   Control by command pulses
   (2) Parallel interface mode:
   Program control by general-purpose I/O (Parallel)
   (3) Serial interface mode:
   Compliant with RS-485, half-duplex asynchronous communication

System Configuration Diagram



Specifications RoHS

Model number			DB21M142S-01	DB22M162S-01
Basic specifications		Motor size	42 mm sq. (1.65 in sq.)	60 mm sq. (2.36 in sq.)
		Input source *1	24 VDC ±10%	
		Source current (A)	2 max.	3 max.
	Environment	Protection class	Class Ⅰ	
		Operation environment	Installation category (over-voltage category): Ⅰ, pollution degree: 2	
		Operating ambient temperature *2	0 to + 40℃	
		Conservation temperature	− 20 to + 60℃	
		Operating ambient humidity	35 to 85% RH (no condensation)	
		Conservation humidity	10 to 90% RH (no condensation)	
		Operation altitude	1000 m (3281 feet) max. above sea level	
		Vibration resistance	Tested under the following conditions ; 100 m/s², frequency range 10 to 2000 Hz, direction along X, Y and Z axes, for 2 hours each	
		Impact resistance	Not influenced at NDS-C-0110 standard section 3.2.2 division "C".	
		Withstandable voltage	Not influenced when 500 VAC is applied between power input terminal and cabinet for one minute.	
		Insulation resistance	10 MΩ min. when measured with 500 VDC megohmmeter between input terminal and cabinet.	
		Mass (Weight)	0.5 kg (1.10 lbs)	0.87 kg (1.92 lbs)
		Allowable thrust load	10 N (2.25 lbs)	15 N (3.37 lbs)
		Allowable radial load	24 N (5.4 lbs)	65 N (14.61 lbs)
		Direction of motor mounting	Can be freely mounted vertically or horizontally	
Function		Protection function	Against driver overheat	
		LED indicator	Alarm monitor	
I/O signals		Command pulse input signal *3	Photocoupler input method, input resistance 220 Ω	Input signal voltage: "H" = 4.0 to 5.5V, "L" = 0 to 0.5V
		Power down input signal (PD)	Photocoupler input method, input resistance 470 Ω	Input signal voltage: "H" = 4.0 to 5.5V, "L" = 0 to 0.5V
		Step angle setting selection input (EXT)	Photocoupler input method, input resistance 470 Ω	Input signal voltage: "H" = 4.0 to 5.5V, "L" = 0 to 0.5V
		FULL/HALF setting selection input (F/H)	Photocoupler input method, input resistance 470 Ω	Input signal voltage: "H" = 4.0 to 5.5V, "L" = 0 to 0.5V
		EMG input signal	Photocoupler input method, input resistance 470 Ω	Input signal voltage: "H" = 4.0 to 5.5V, "L" = 0 to 0.5V
		BUSY output signal	Open collector output by photocoupler	Output signal standard: Vceo = 30 V max., Ic = 20 mA max.
		Phase origin monitor output signal (MON)	Open collector output by photocoupler	Output signal standard: Vceo = 30 V max., Ic = 20 mA max.
		Alarm output signal (AL)	Open collector output by photocoupler	Output signal standard: Vceo = 30 V max., Ic = 20 mA max.

*1 Note that the power voltage must not exceed 24 VDC + 10% (26.4 VDC).
*2 If the driver is placed in a box, the temperature inside the box must not exceed this specified range.
*3 The maximum input frequency is 250 k pulse/s.

Safety standards

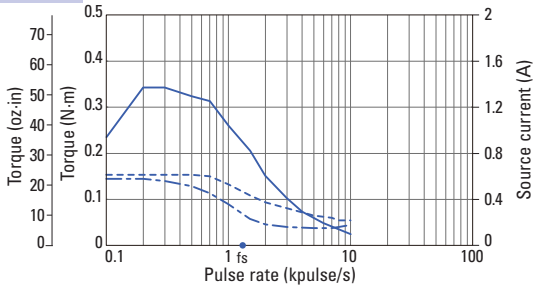
	Directives	Category	Name	Applicable standard	
				DB21M142S-01	DB22M162S-01
CE (TÜV)	Low-voltage directives	—	—	EN60034-1	EN60034-1
				EN60034-5	EN60034-5
				EN61010-1	EN61010-1
	EMC directives	Emission	Terminal disturbance voltage	EN55011-A	EN61000-6-4
			Electromagnetic radiation disturbance	EN55011-A	EN61000-6-4
		Immunity	ESD (Electrostatic discharge)	EN61000-4-2	EN61000-4-2
			RS (Radio-frequency amplitude modulated electromagnetic field)	EN61000-4-3	EN61000-4-3
			Fast transients/burst	EN61000-4-4	EN61000-4-4
			Conducted disturbances	EN61000-4-6	EN61000-4-6
UL	Acquired standards		Applicable standard	File No.	
	UL		UL508C	E179775	
	UL for Canada				

- EMC characteristics may vary depending on the configuration of the users' control panel, which contains the driver or stepping motor, or the arrangement and wiring of other electrical devices.
  Parts for EMC noise suppression like noise filters and toroidal type ferrite cores may be required depending on circumstances.
- Validation test of driver has been performed for low-voltage EMC directives at TÜV (TÜV product service) for self-declaration of CE marking.

Characteristics diagram

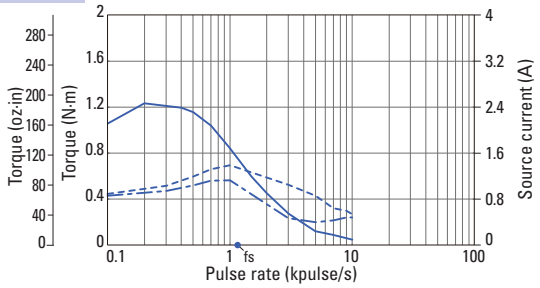
Pull-out torque —— Source current (no load) —·—·— Source current (load applied) - - - -

DB21M142S-01



Constant current circuit
Source voltage: 24 VDC
Operating current: 2 A/phase, 2-phase energization (full-step)
J_L=[0.94 × 10⁻⁴kg·m² (5.14 oz·in²) use the rubber coupling]

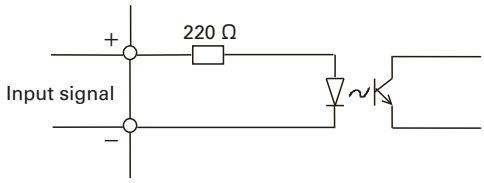
DB22M162S-01



Constant current circuit
Source voltage: 24 VDC
Operating current: 3 A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg·m² (14.22 oz·in²) use the rubber coupling]

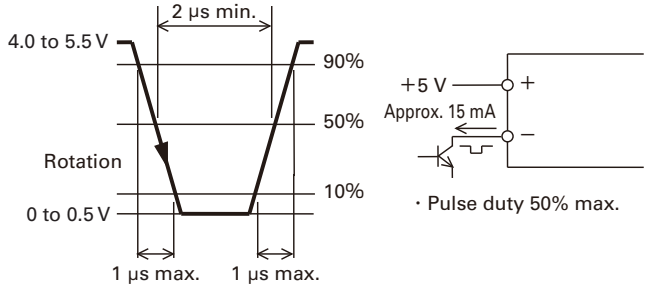
Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Input Circuit Configuration (CW, CCW)

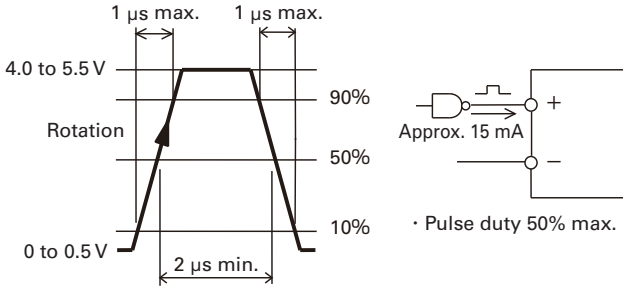


Input signal specifications

Negative logic

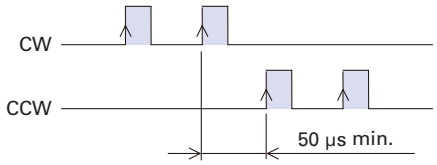


Positive logic



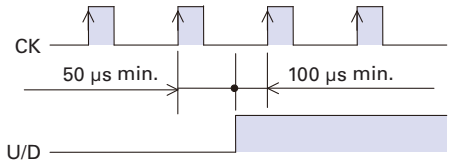
Timing of the command pulse

2-input mode (CW, CCW)



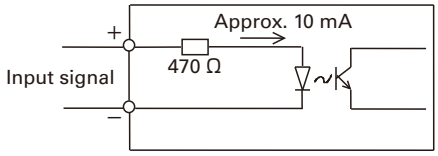
- Shaded area ▒ indicates internal photocoupler ON. Internal circuit (motor) starts operating at leading edge of the photocoupler ON.
- To apply pulse to CW, set CCW side internal photocoupler to OFF.
- To apply pulse to CCW, set CW side internal photocoupler to OFF.

Pulse and direction mode (CK, U/D)

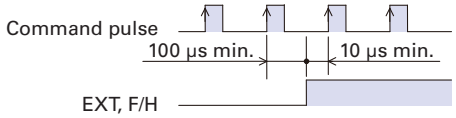


- Shaded area ▒ indicates internal photocoupler ON. Internal circuit (motor) starts operating at leading edge of CK side photocoupler ON.
- Switching of U/D input signal must be done while CK side internal photocoupler is OFF.

Input Circuit Configuration (PD, EXT, F/H, EMG)

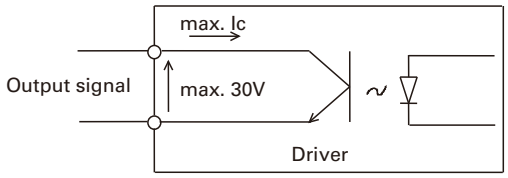


Timing of command pulse, step angle selection, and FULL/HALF selection input signal



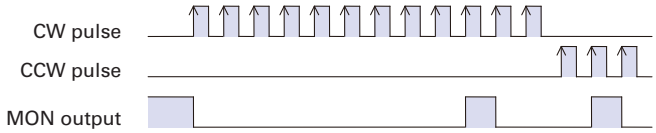
- ▒ Shaded area indicates internal photocoupler ON.
- EXT input signal
  EXT photocoupler ON enables a function by external F/H input signal.
  EXT photocoupler OFF enables the setting of a number of micro steps by main unit's rotary switch S.S.
- F/H input signal
  F/H photocoupler ON sets HALF step (2-division) operation.
  F/H photocoupler OFF sets FULL step (1-division) operation.
- Refer to switching EXT and F/H input signal in the [FULL/HALF input signal, command pulse, and step angle select].
- When switching the step angle by EXT and F/H input signal, the phase origin LCD may not turn ON and the phase origin monitor output may not output when stop.
  Refer to the MON output in the [Output Interface].

Output Interface (BUSY, MON, AL)



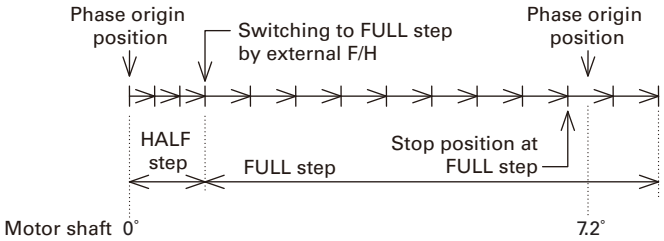
- Max. Ic current: 20 mA

MON output



- When the motor excitation phase is at the phase origin (power ON status), the photocoupler is turned ON, and the upper D.P of status LED turns on synchronously.
- MON output is taken at every 3.6 degrees of motor output shaft from phase origin.

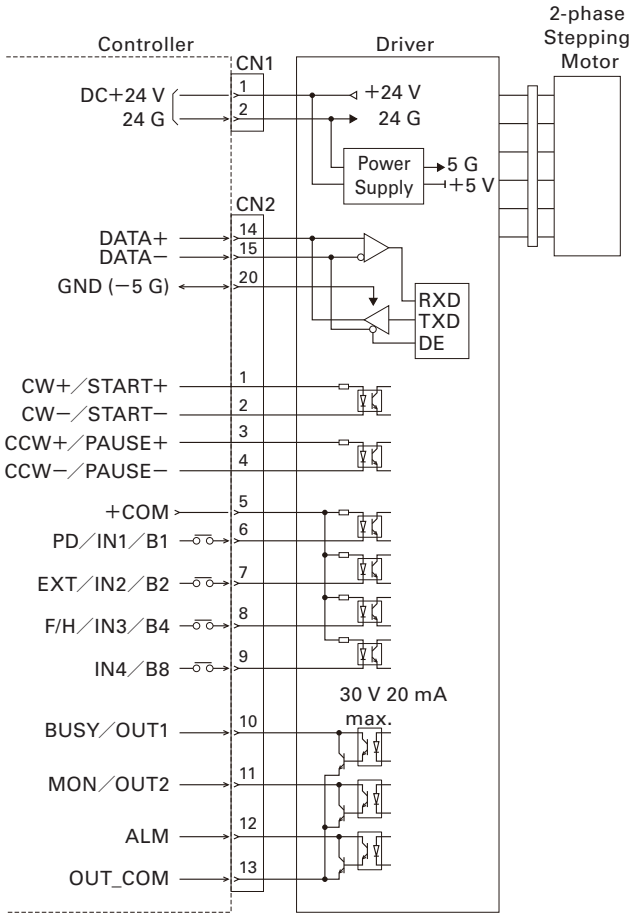
When changing the division setting by F/H input signal.



- When changing the motor division setting by the external input signal and the rotary switch as shown in the example below, the motor cannot stop where MON output signal can be output. Take this into consideration when using the MON output signal.

Connections and Signals

External wiring diagram



Wiring

Specification summary of input/output signals (Parallel I/F mode)

Signal	Reference Designation	Pin Number	Function Summary
Program drive start/stop	START + START −	1 2	Commands the start and stop of program driving. Internal photocoupler on ···Program driving start Internal photocoupler off ···Program driving stop
Program pause	PAUSE + PAUSE −	3 4	When START signal is on, a pause in program driving is commanded. Internal photocoupler on ···Program driving pause Internal photocoupler off ···Program driving pause release
General-purpose input common	+ COM	5	Input signal common of the 6 to 9 pins DC5V is input.
Alarm clear signal (standard)	ALMC	6	Recoverable alarms are cleared. Internal photocoupler off → on···Alarm clear
General-purpose input 1	IN1	6	This is a general-purpose input signal that can be used by program driving. Internal photocoupler on ···General purpose input 1 on Internal photocoupler off ···General purpose input 1 off
Program number selection bit 1	B1	6	The program number is selected along with other bits. (Subordinate bit) Internal photocoupler on···Corresponding bit 1 Internal photocoupler off···Corresponding bit 0
Emergency stop input	EMG	6	The emergency stop signal is input. Internal photocoupler on···No emergency stop Internal photocoupler off···Emergency stop
Origin signal	ORG	6	The origin signal used for the return to origin operation is input. Internal photocoupler on···Origin signal on Internal photocoupler off···Origin signal off
+ direction overtravel signal	+ OT	7	An overtravel signal in the + direction is input. Internal photocoupler on ···+ direction overtravel not arrived Internal photocoupler off ···+ direction overtravel arrived
General-purpose input 2	IN2	7	This is a general-purpose input signal that can be used by program driving. Internal photocoupler on ···General purpose input 2 on Internal photocoupler off ···General purpose input 2 off
Program number selection bit 2	B2	7	The program number is selected along with other bits. (The second bit from the subordinate) Internal photocoupler on···Corresponding bit 1 Internal photocoupler off···Corresponding bit 0
Emergency stop input	EMG	7	The emergency stop signal is input. Internal photocoupler on···No emergency stop Internal photocoupler off···Emergency stop
Origin signal	ORG	7	The origin signal used for the return to origin operation is input. Internal photocoupler on···Origin signal on Internal photocoupler off···Origin signal off
Alarm clear signal	ALMC	7	Recoverable alarms are cleared. Internal photocoupler off → on···Alarm clear
− direction overtravel signal	− OT	8	An overtravel signal in the − direction is input. Internal photocoupler on ····− direction overtravel not arrived Internal photocoupler off ····− direction overtravel arrived
General-purpose input 3	IN3	8	This is a general-purpose input signal that can be used by program driving. Internal photocoupler on ···General purpose input 3 on Internal photocoupler off ···General purpose input 3 off
Program number selection bit 4	B4	8	The program number is selected along with other bits. (The third bit from the subordinate) Internal photocoupler on···Corresponding bit 1 Internal photocoupler off···Corresponding bit 0
Emergency stop input	EMG	8	The emergency stop signal is input. Internal photocoupler on···No emergency stop Internal photocoupler off···Emergency stop
Origin signal	ORG	8	The origin signal used for the return to origin operation is input. Internal photocoupler on···Origin signal on Internal photocoupler off···Origin signal off
Alarm clear signal	ALMC	8	Recoverable alarms are cleared. Internal photocoupler off → on···Alarm clear
Emergency stop signal	EMG	9	The emergency stop signal is input. Internal photocoupler on ···No emergency stop Internal photocoupler off ···Emergency stop
General-purpose input 4	IN4	9	This is a general-purpose input signal that can be used by program driving. Internal photocoupler on ···General purpose input 4 on Internal photocoupler off ···General purpose input 4 off
Program number selection bit 8	B8	9	The program number is selected along with other bits. (The fourth bit from the subordinate) Internal photocoupler on···Corresponding bit 1 Internal photocoupler off···Corresponding bit 0
Origin signal	ORG	9	The origin signal used for the return to origin operation is input. Internal photocoupler on···Origin signal on Internal photocoupler off···Origin signal off
Alarm clear signal	ALMC	9	Recoverable alarms are cleared. Internal photocoupler off → on···Alarm clear
During motor operation	BUSY	10	The operation status of the motor is output. Internal photocoupler on ···During motor operation Internal photocoupler off ···During motor stop
During program execution	PEND	10	The execution status of the program is output. Internal photocoupler on ···During program execution Internal photocoupler off ···Program execution complete
Zone signal	ZONE	10	Turns on when the current position is inside the coordinates that were set beforehand.
During program execution	PEND	11	The execution status of the program is output. Internal photocoupler on ···During program execution Internal photocoupler off ···Program execution complete
During motor operation	BUSY	11	The operation status of the motor is output. Internal photocoupler on ···During motor operation Internal photocoupler off ···During motor stop
Zone signal	ZONE	11	Turns on when the current position is inside the coordinates that were set beforehand.
Alarm output	ALM	12	When various alarm circuits operate in the driver, an external signal is output. At this time, the stepping motor changes to non-excited status.
Output signal common	OUT_ COM	13	This is for the output signal common.
DATA +	DATA +	14	This is for the serial signal.
DATA −	DATA −	15	This is for the serial signal.

Specification summary of input/output signals (Serial I/F mode)

Signal	Reference Designation	Pin Number	Function Summary
General-purpose input common	+ COM	5	Input signal common of the 6 to 9 pins DC 5V is input.
Alarm clear signal (standard)	ALMC	6	Recoverable alarms are cleared. Internal photocoupler off → on···Alarm clear
General-purpose input 1	IN1	6	This is a general-purpose input signal that can be used by program driving. Internal photocoupler on ···General purpose input 1 on Internal photocoupler off ···General purpose input 1 off
Emergency stop input	EMG	6	The emergency stop signal is input. Internal photocoupler on···No emergency stop Internal photocoupler of···Emergency stop
Origin signal	ORG	6	The origin signal used for the return to origin operation is input. Internal photocoupler on···Origin signal on Internal photocoupler off···Origin signal off
+ direction overtravel signal	+ OT	7	An overtravel signal in the + direction is input. Internal photocoupler on ···+ direction overtravel not arrived Internal photocoupler off ···+ direction overtravel arrived
General-purpose input 2	IN2	7	This is a general-purpose input signal that can be used by program driving. Internal photocoupler on ···General purpose input 2 on Internal photocoupler off ···General purpose input 2 off
Emergency stop input	EMG	7	The emergency stop signal is input. Internal photocoupler on···No emergency stop Internal photocoupler off···Emergency stop
Origin signal	ORG	7	The origin signal used for the return to origin operation is input. Internal photocoupler on···Origin signal on Internal photocoupler off···Origin signal off
Alarm clear signal	ALMC	7	Recoverable alarms are cleared. Internal photocoupler off → on···Alarm clear
− direction overtravel signal	− OT	8	An overtravel signal in the − direction is input. Internal photocoupler on ···− direction overtravel not arrived Internal photocoupler off ···− direction overtravel arrived
General-purpose input 3	IN3	8	This is a general-purpose input signal that can be used by program driving. Internal photocoupler on ···General purpose input 3 on Internal photocoupler off ···General purpose input 3 off
Emergency stop input	EMG	8	Emergency stop signal is input. Internal photocoupler on···No emergency stop Internal photocoupler off···Emergency stop
Origin signal	ORG	8	The origin signal used for the return to origin operation is input. Internal photocoupler on···Origin signal on Internal photocoupler off···Origin signal off
Alarm clear signal	ALMC	8	Recoverable alarms are cleared. Internal photocoupler off → on···Alarm clear
Emergency stop signal	EMG	9	The emergency stop signal is input. Internal photocoupler on···No emergency stop Internal photocoupler off···Emergency stop
General-purpose input 4c	IN4	9	This is a general-purpose input signal that can be used by program driving. Internal photocoupler on ···General purpose input 4 on Internal photocoupler off ···General purpose input 4 off
Origin signal	ORG	9	The origin signal used for the return to origin operation is input. Internal photocoupler on···Origin signal on Internal photocoupler off···Origin signal off
Alarm clear signal	ALMC	9	Alarms are cleared. Internal photocoupler off → on···Alarm clear
During motor operation	BUSY	10	The operation status of the motor is output. Internal photocoupler on···During motor operation Internal photocoupler off···During motor stop
During program execution	PEND	10	The execution status of the program is output. Internal photocoupler on ···During program execution Internal photocoupler off ···Program execution complete
Zone signal	ZONE	10	This is on when the current position is inside the coordinates that were set beforehand.
During program execution	PEND	11	The execution status of the program is output. Internal photocoupler on ···During program execution Internal photocoupler off ···Program execution complete
During motor operation	BUSY	11	The operation status of the motor is output. Internal photocoupler on···During motor operation Internal photocoupler off···During motor stop
Zone signal	ZONE	11	Turns on when the current position is inside the coordinates that were set beforehand.
Alarm output	ALM	12	When various alarm circuits operate in the driver, an external signal is output. At this time, the stepping motor changes to non-excited status.
Output signal common	OUT_ COM	13	This is for the output signal common.
DATA +	DATA +	14	This is for the serial signal.
DATA −	DATA −	15	This is for the serial signal.

Specification summary of input/output signals (Pulse train I/F mode)

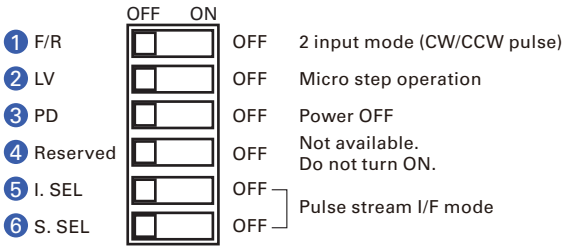
Signal	Reference Designation	Pin Number	Function Summary
CW pulse input (Standard)	CW + CW −	1 2	When in "2 input mode", Input drive pulse rotating CW direction.
Pulse train input	CK + CK −	1 2	When in "1 input mode", Input drive pulse train for motor rotation.
CCW pulse input (Standard)	CCW + CCW −	3 4	When in "2 input mode", Input drive pulse rotating CCW direction.
Rotational direction input	U／D + U／D −	3 4	When in "1 input mode", Input motor rotational direction signal. Internal photocoupler ON···CW direction Internal photocoupler OFF···CCW direction
General-purpose input common	+ COM	5	Input signal common of the 6 to 9 pins DC5V is input.
Power down input	PD	6	Inputting PD signal will cut off (power off) the current flowing to the motor (with DIP switch select, change to the Power low function is possible). PD input signal on (internal photocoupler on) ···PD function is valid. PD input signal off (internal photocoupler off) ···PD function is invalid.
Step angle select input	EXT	7	FULL/HALF select input will become valid by inputting EXT signal. EXT input signal on (internal photocoupler on) ···External input signal F/H is valid EXT input signal off (internal photocoupler off) ···Main body rotary switch S.S is valid
FULL/HALF select input	F／H	8	When EXT input signal on (internal photocoupler on), F/H input signal on (internal photocoupler on) ···HALF step F/H input signal off (internal photocoupler off) ···FULL step
—	—	9	Reserved
During motor operation	BUSY	10	The operation status of the motor is output. Internal photocoupler on ···During motor operation Internal photocoupler off ···During motor stop
Phase origin monitor output	MON	11	When the excitation phase is at the origin (during power ON), this turns on. For FULL step, ON occurs once per 4 pulses; and for HALF step, ON occurs once per 8 pulses.
Alarm output	ALM	12	When the alarm circuits are actuated inside, the driver, outputs signals to outside. Then, the stepping motor changes to unexcited status.
Output signal common	OUT_ COM	13	This is for the output signal common.

・As for the motor rotational direction, CW direction is regarded as the clockwise revolution, and CCW direction is regarded as the counterclockwise revolution when viewing the motor from output shaft side.

Set Up

■Function select DIP switch

The functions according to the specification can be selected with this DIP switch.
Confirm the ex-factory setting as follows.



◎ **For parallel I/F mode or serial I/F mode**

The communication speed of serial communication is set.

Switch	Set value	Communication speed (bps)		
		9,600	19,200	38,400
F/R	OFF	✓	✓	✓
	ON			
LV	OFF	✓	✓	
	ON			✓
PD	OFF	✓		✓
	ON		✓	

- The setting change after the power supply is turned on is invalid. It does not function as a F/R, LV, and PD.
- The communication speed of pulse stream I/F mode is fixed at 9600bps.

◎ **For pulse stream I/F mode**

1 Input mode select (F/R)

Input pulse mode selection
This switch setting is only effective in pulse stream I/F mode.

F/R	Input pulse mode
ON	1 input mode (CK,U/D)
OFF	2 input mode (CW,CCW)

2 Low vibration mode select (LV)

Low vibration and smooth operation are enabled even during coarse resolution settings (e.g. 1 division, 2 division).
This switch setting is only effective in pulse stream I/F mode.
For parallel I/F mode and serial I/F mode, this is usually a low vibration operation.

LV	Operation
ON	Low vibration operation
OFF	Micro step operation

- When LV select is ON (low vibration mode), operational process of driving pulse will be carried out inside the Driver. Therefore, the Motor movement delays for the time of 3.2ms pulse per input pulse. Note that depending upon the combined Motor, load, driving profile etc., it may take a while until the shaft is adjusted when the Motor stops. (In parallel I/F mode and serial I/F mode there is no delay)

3 Power down select (PD)

Select the Motor winding current value when inputting the power down signal. This switch setting is only effective in pulse stream I/F mode.

PD	Motor winding current
ON	Current value by rotary switch STP (Power Low)
OFF	0A (Power OFF)

- PD function (the setting selected by PD of the function select DIP switch) is enabled by PD input signal ON (built-in photocoupler ON) of Input/Output signal connector (CN2). Power down signal input takes priority over all the other current settings except for alarms. The operational status may not be able to be maintained due to power swings caused by a drop in output torque, or due to dropped work caused by motor current OFF (unexcited motor).
  Pay extra attention to the input timing of the power down signal and also install security devices to the machine.

4 Reserved

- Do not turn ON this switch.

5 , 6 Operation mode selection (I.SEL, S.SEL)

The operation mode is selected.

I.SEL	S.SEL	Operation mode
OFF	–	Pulse stream I/F mode
ON	OFF	Parallel I/F mode
	ON	Serial I/F mode

- Change the operation mode selection switch after shutting off the driver's power supply.

■Rotary switch (RSW) and the mode change switch (PSW)

◎ **For pulse stream I/F mode**

The combination of rotary switch (RSW) and mode change switch (PSW) select the step angle, driving current and stop the current.

1. Step angle select (S.S)

The divisions of the basic step angle (0.9° /step) during micro step driving can be set.

Gradation	0	1	2	3	4	5	6	7
Partition	1	2	2.5	4	5	8	10	20
Gradation	8	9	A	B	C	D	E	F
Partition	25	40	50	80	100	125	200	250

Initial setting is at gradation 1 (division 2)

- The step angle select switch (S.S) and the number of partitions become invalid by EXT input signal ON (built-in photocoupler ON) of Input/Output signal connector (CN2).

2. Driving current select (RUN)

The Motor operation current value can be selected.

Gradation	0	1	2	3	4	5	6	7
Motor current (%)	100 (rated)	95	90	85	80	75	70	65
Gradation	8	9	A	B	C	D	E	F
Motor current (%)	60	55	50	45	40	35	30	25

Initial setting is at gradation 0 (motor current 100%, rated).

- When there is a sufficient extra motor torque, lowering the operation current value will be effective in the lower vibration. The Motor output torque is almost proportional to the current value. When adjusting the operational torque, confirm the sufficient operation margin and determine the Motor current value.

3. Current Select when Stop (STP)

The motor current value when, stopped and when power down input signal ON (power low function is selected by DIP switch) can be selected.

Gradation	0	1	2	3	4	5	6	7
Motor current (%)	100 (rated)	95	90	85	80	75	70	65
Gradation	8	9	A	B	C	D	E	F
Motor current (%)	60	55	50	45	40	35	30	25

Initial setting is set at gradation A (motor current 50%).

- The current setting when stop by STP becomes valid when the motor stops (approximately 200 ms after the last pulse input) and when power down input signal output torque is approximately proportional to motor current.
  Pay attention to output torque when stopping motor (especially when dropping Z-axis workload).
- If motor output torque is unconstrained, motor/driver heating can be suppressed by selecting appropriate drive current and stopping current settings.

◎ **For parallel I/F mode and serial I/F mode**

The slave bureau address of serial communications can be set.

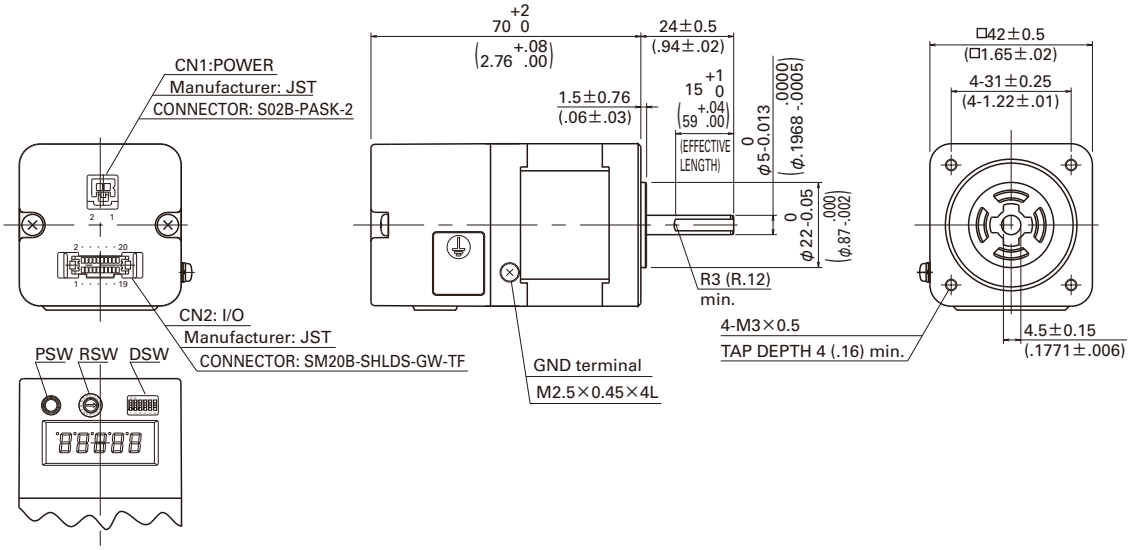
RSW	Slave station address (HEX)
0	0
1	1
:	:
E	E
F	F

Initial setting is set at 0

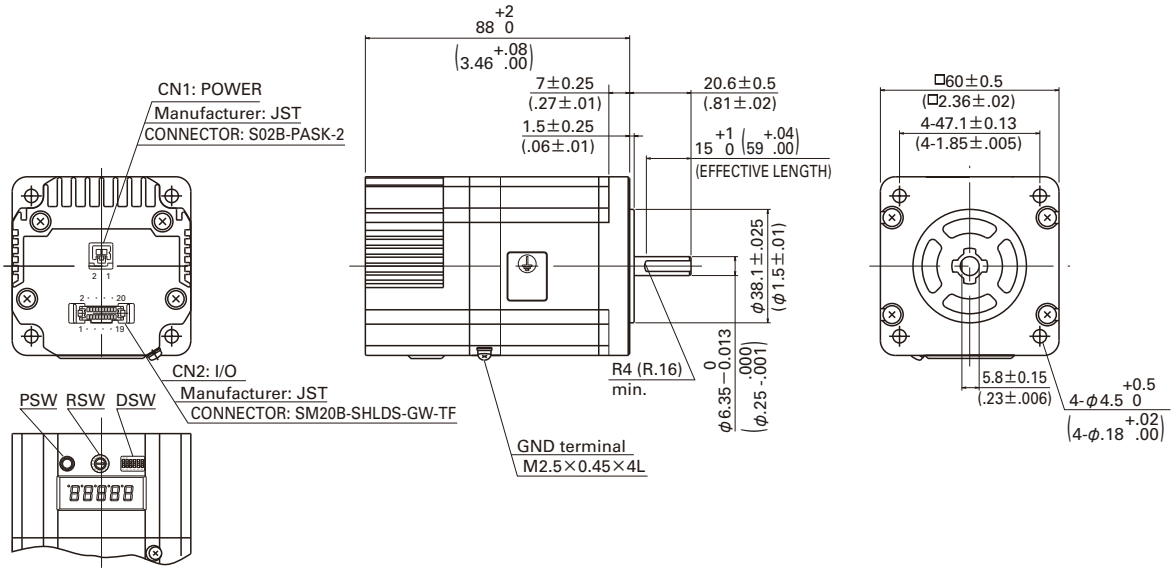
- The slave station address of the pulse stream I/F mode is fixed at 0.

Dimensions [Unit: mm (inch)]

42 mm sq. (1.65 inch sq.)



60 mm sq. (2.36 inch sq.)



Safety Considerations

Drivers and stepping motors are designed to be used with the general industrial devices.
When using them, pay sufficient attention to the following points.

- Read the Operation Manual throughly prior to placement, assembly and/or operation in order to use the product properly.
- Refrain from modifying or processing the product in any way.
- Consult with the distributor or professional experts for placement or maintenance services of the product.
- In case of the following uses of the product, contact us for the special care required to the operation, maintenance and management such as multiplexing the system, installing an emergency electric generator set, or so forth.
  - ❶ **Use in medical devices concerned with a fatal accident.**
  - ❷ **Use on trains, elevators, and so forth that are likely to cause an accident resulting in injury, damage or death.**
  - ❸ **Use in computer systems that could have a great effect on society or public systems.**
  - ❹ **Use in other devices highly influential to maintaining the human safety or the public functions.**

In addition to the above, consult with us for use in such a vibration environment as automobile or transportation.
Make yourself knowledgeable and familiarize with the devices, safety issues and cautions before handling the product.

Indication by (Warning Label) on the Product

Either or all of the following indications are expressed by the Warning Labels depending on the type of driver or stepping motor.

This label is affixed near high voltage parts such as the electrically charged or cover-protected section, warning of the places where it is likely to cause an electric shock.

This label is affixed near the place where the driver or stepping motor body should be easily acknowledged, warning that it is likely to cause burns from high temperature.

This label is affixed near the GND terminals of the driver or stepping motors for which grounding is required, suggesting that the terminals should be well grounded.

This label is affixed for the driver to which the power source is applied in the voltage exceeding the safety standard, drawing attention to the risk of the electric shock.

Safety Ranks of the Cautions

Following four ranks are provided.

DANGER Improper operations or use is most likely to result in serious injury or death.

CAUTION Improper operations or use is likely to result in average or minor injury, or in property damage.

> In spite of the cautions with the ⚠CAUTION label, it may cause serious results.
> Either the contents or the labels is describing important cautions to be followed inevitably.

PROHIBITED Indicates what must not be done.

COMPULSORY Indicates what must be done.

DANGER

< General matters >

1. Do not use the product in an explosive, flammable or corrosive atmosphere, watery place or near a combustible material. Doing so may cause injury or fire.
2. Have a person with expert knowledge for performing the transportation, placement, wiring, operation, maintenance or inspection of the product.
   Without such knowledge, it may cause an electric shock, injury or fire.
3. Do not work for wiring, maintenance servicing or inspection with the electric power on. Perform either of those five minutes after turning the power off, or otherwise, it may cause an electric shock.
4. When the protective functions of the product is activated, turn the power off mmediately and eliminate the cause. If continuing the operation without eliminating the cause, the product may operate improperly and cause injury or a breakdown of the system devices.
5. Stepping motor may run out of order at the operating and stopping occasions, depending on the magnitude of the load. Put the product into use after confirming with the adequate trial test operation in the maximum load conditions that the product performs reliable operation. Doing otherwise may cause a breakdown of the system. (Should the product run out of order in the use to drive upward/ downward, it may cause a fall of the load.)
6. Do not touch the internal parts of the driver. Doing so may cause an electric shock.

< Wiring >

7. Do not connect the stepping motor directly with the commercial power outlet. Doing so may cause an electric shock, injury or fire. The power shall be supplied to the stepping motor through the driving circuit.
8. Use the electric power source within the rated input voltage. Using otherwise may cause fire or an electric shock.
9. Connect the driver and stepping motor to the ground. Using without grounding may cause an electric shock.
10. Do not harm, forcibly put a stress, or load a heavy article on the cable or get it caught between the articles. Doing so may cause an electric shock.
11. Perform wiring with the power cable as instructed by the wiring diagram or the Operation Manual. Doing otherwise may cause an electric shock or fire.

< Operation >

12. Be sure not to touch the rotating part of the stepping motor during its operation. Touching it may cause injury.
13. Neither reach or touch the electric terminals while electric power is on. Doing so may cause an electric shock.
14. Never disconnect any of the connectors while electric power is on. Doing so may cause an electric shock and corruption.

CAUTION

< General matters >

1. Prior to placement, operation, maintenance servicing or inspection, be sure to read the Operation Manual and follow the instructions to perform those. Failure to follow the instructions may cause an electric shock, injury or fire.
2. Do not use the driver or the stepping motor outside the specified conditions.
   Doing so may cause an electric shock, injury or fire.
3. Do not insert a finger or a thing into the opening of the product. Doing so may cause an electric shock, injury or fire.
4. Do not use the damaged driver or stepping motor. Doing so may cause injury, fire or the like.
5. Use the driver and stepping motor in the designated combination. Using otherwise may cause fire or a trouble.
6. Be careful that the temperature rises in the operating driver, stepping motor or peripheral devices. Failure to be careful may cause a burn.

< Unpacking >

7. Unpack while confirming the ceiling. Failure to do so may cause injury.
8. Confirm if the product is the one having been ordered. Installing an incorrect product may cause a breakdown.

< Wiring >

9. Do not perform measurement of the insulation resistance or withstand insulation voltage of the product. Doing so may cause a breakdown. Instead, contact with us for such inspection.
10. Perform wiring conforming to the technical standards of electric facility or the internal rule. Doing otherwise may cause burning or fire.
11. Ensure that wiring has been correctly done. Operating without correct wiring may cause the stepping motor to run out of control and result in injury.
12. Take insulation process for the attached condenser or the external resistance connection terminals. Failure to do so may cause an electric shock.

< Placement >

13. Do not climb or attach a heavy article on the product. Doing so may cause injury.
14. Neither block nor stuff the aspiration/exhaust vent with a foreign particle. Doing so may cause fire.
15. Make sure to use the specified driver mounting direction. Failure to do so will result in product failure.
16. Keep a distance as instructed by the Operation Manual for the driver from the inner surface of the control console or other devices. Failure to do so may cause a trouble.
17. Place the product with a great care so as to prevent from the danger such as a tumble or a turnover.
18. Mount the product on an incombustible material such as metal. Doing otherwise may cause fire.
19. Confirm the rotating direction before connecting with the mechanical device. Failure to do so may cause injury or a breakdown.
20. Do not touch the motor output spindle (including the key slot and gears) with a bare hand. Doing so may cause injury.
21. Do not apply a load to the output shaft of the motor that exceeds the tolerance.
22. Make sure not to apply force to the lead wire or cables.

< Operation >

23. The stepping motor is not equipped with any protective device. Takeprotective measures using an over-current protective relay, a ground fault interrupter, a protective device from excess temperature, and an emergency stopping device. Failure to do so may cause injury or fire.
24. Do not touch the product for a period after the power is on or has been turned off, since the driver and stepping motor remain in the high temperature. Doing so may cause burns. Especially the temperature rises considerably of the stepping motor depending on the operating conditions. Use the motor on the condition so that its surface temperature becomes 100˚ C or under.
25. Stop the operation immediately when an emergency occurs. Failure to do so may cause an electric shock, injury or fire.
26. Do not change adjustment to an extreme, for such a change results in the unstable operation. Doing so may cause injury.
27. When conducting the trial operation, make the stepping motor fixed firmly, and confirm the operation by disconnecting with the mechanical system before connecting with it. Failure to do so may cause injury.
28. When the alarm has been activated, eliminate the cause and ensure the safety to resume operation. Failure to do so may cause injury.
29. When the electric power recovers after the momentary interruption, do not approach the devices because the system may re-start operation by itself. (Set the system so as to secure the safety even when it re-start on such occasion.) Failure to do so may cause injury.
30. Confirm that the electric power supply is all proper conforming to the specifications. Failure to do so may cause a trouble.
31. The brake mechanism of the motor with the electro-magnetic brake is to hold the movable section and the motor position. Do not use it as a safety measure, or doing so may cause the breakdown of the system.
32. Fix the key firmly when operating the motor with key individually. Failure to do so may cause injury.

< Maintenance services >

33. Be careful when performing maintenance services or inspection about the temperature which rises highly in the driver and stepping motor frame. Failure to do so may cause burns.
34. It is recommended to replace the electrolytic condenser of the driver with a new one for securing the preventive measure after using for 5 years, the expected life in the average 40˚C. The expected life of the fuse is 10 years in the average 40˚C. Thus, the periodical replacement is recommended.
35. Contact with us for repair. If the product is disassembled by the user, it may put it out of action.

< Transportation >

36. Handle the product with care during transportation so as to prevent from the danger such as a tumble or a turnover.
37. Do not hold with the cable or the motor spindle. Doing so may cause a trouble or injury.

< Retirement >

38. When scrapping the driver or stepping motor, treat it for the general industrial waste.

PROHIBITED

< Storage >

1. Avoid the place exposed to rain or water drops, or in an environment with hazardous gas or liquid for storing the product. Failure to do so may cause a trouble.

< Maintenance services >

2. Do not disassemble or repair the product. Doing so may cause fire or an electric shock.

< General matters >

3. Do not remove the rating plate.

COMPULSORY

< Storage >

1. Store the product within the specified conservation temperature and humidity in the place not exposed to the sun beam.
2. If the driver has been stored for a long period (3 years or longer for a guide), consult with us. The capacitance may have decreased with the electrolytic condenser due to the long period storage, and it may cause a trouble.

< Operation >

3. Install an external emergency stop circuit to turn the power off for the instant halt of operation.
4. Put the product into operation in the specified ambient temperature and humidity.

< Transportation >

5. Excess loading of the product on the carrier may cause the load to fall in pieces. Follow the instructions given outside the package.

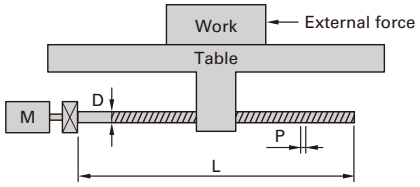
MEMO

MEMO

■Selection materials for each mechanism

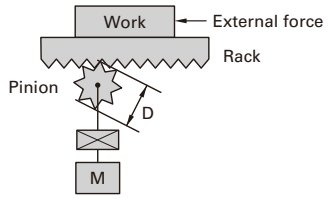
The diagrams below depict representative mechanisms and the points used in their selection. Notify us of the information shown here when requesting us to make a selection.

Ball screw



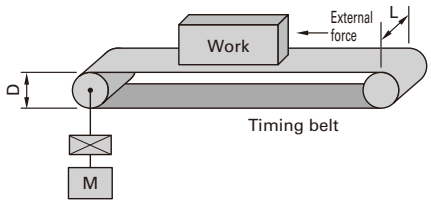
External force	F	N
Weight of work+table	W	kg
Ball screw diameter	D	m
Ball screw length	L	m
Ball screw lead wire	P	m
Ball screw material specific gravity	ρ	kg/m^3
Friction coefficient	μ	
Gear ratio*	G	
Mechanical efficiency	η	

Rack and pinion



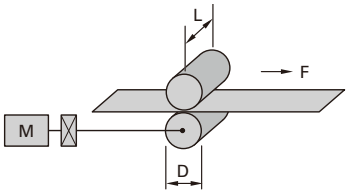
External force	F	N
Work+rack weight	W	kg
Pinion diameter	D	m
Pinion thickness	L	m
Pinion material specific gravity	ρ	kg/m^3
Friction coefficient	μ	
Gear ratio*	G	
Mechanical efficiency	η	

Belt drive



External force	F	N
Work+belt weight	W	kg
Pulley diameter	D	m
Pulley width	L	m
Pulley material specific gravity	ρ	kg/m^3
Pulley moment of inertia	J	kg・m^2
Gear ratio*	G	
Mechanical efficiency	η	

Roll feed



Sheet tension	F	N
Roll diameter	D	m
Roll width	L	m
Roll material specific gravity	ρ	kg/m^3
Roll moment of inertia	J	kg・m^2
Gear ratio*	G	
Mechanical efficiency	η	

Rotary table

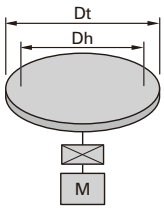
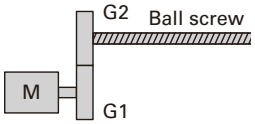


Table weight	W	kg
Table diameter	Dt	m
Table support diameter	Dh	m
Table moment of inertia	J	kg・m^2
Support area friction coefficient	μ	
Gear ratio*	G	
Mechanical efficiency	η	

*How to find the gear ratio (G)



$$G = \frac{\text{Number of ball screw gears (G2)}}{\text{Number of motor gears (G1)}}$$

■ Precautions For Adoption

Failure to follow the precautions on the right may cause moderate injury and property damage, or in some circumstances,could lead to a serious accident. Always follow all listed precautions.

⚠ Cautions

- Read the accompanying Instruction Manual carefully prior to using the product.
- If applying to medical devices and other equipment affecting people's lives, please contact us beforehand and take appropriate safety measures.
- If applying to equipment that can have significant effects on society and the general public, please contact us beforehand.
- Do not use this product in an environment where vibration is present, such as in a moving vehicle or shipping vessel.
- Do not perform any retrofitting, re-engineering, or modification to this equipment.
- The products presented in this catalog are meant to be used for general industrial applications. If using for special applications related to aviation and space, nuclear power, electric power, submarine repeaters, etc., please contact us beforehand.

*For any question or inquiry regarding the above, contact our Sales Department.

http://www.sanyodenki.com

SANYO DENKI CO., LTD.
3-33-1, Minami-Otsuka, Toshima-ku, Tokyo, 170-8451, Japan
TEL: +81 3 5927 1020

SANYO DENKI *EUROPE SA.*
P.A. Paris Nord Ⅱ, 48 Allée des Erables-VILLEPINTE, BP.57286, F-95958 ROISSY CDG Cedex, France
TEL: +33 1 48 63 26 61

SANYO DENKI *AMERICA,INC.*
468 Amapola Avenue Torrance, CA 90501, U.S.A.
TEL: +1 310 783 5400

SANYO DENKI *SHANGHAI CO., LTD.*
Room 2106-2109, Bldg A, Far East International Plaza, No.319, Xianxia Road, Shanghai, 200051, China
TEL: +86 21 6235 1107

Beijing Branch
Room1222, Tower B, Beijing COFCO Plaza, No.8 Jianguomennei Dajie, Dong Cheng District, Beijing 100005 China
TEL: +86 10 6522 2160

SANYO DENKI *(H.K.)CO., LIMITED*
Room 2305, 23/F, South Tower, Concordia Plaza, 1 Science Museum Road, TST East, Kowloon, Hong Kong
TEL: +852 2312 6250

Tianjin Representative Office
Room AB 16th Floor TEDA Building, No. 256 Jie Fang Nan Road, Hexi District, Tianjin 300042 China
TEL: +86 22 2320 1186

Chengdu Representative Office
Room2105B, Block A, Times Plaza, 2 Zongfu Road, Jinjiang District, Chengdu, 610016 China
TEL: +86 28 8661 6901

SANYO DENKI *TAIWAN CO., LTD.*
N-711, 7F, Chia Hsin 2nd Bldg., No.96, Sec.2, Zhongshan N. Rd., Taipei 10449, Taiwan (R.O.C.)
TEL: +886 2 2511 3938

SANYO DENKI *SINGAPORE PTE. LTD.*
988 Toa Payoh North, #04-05/06/07/08, Singapore 319002
TEL: +65 6223 1071

Indonesia Representative Office
Summitmas II 4th Floor, Jl. Jend. Sudirman Kav.61-62, Jakarta 12190, Indonesia
TEL: +62 21 252 3202

SANYO DENKI *GERMANY GmbH*
Frankfurter Strasse 92, 65760 Eschborn, Germany
TEL: +49 6196 76113 0

SANYO DENKI *KOREA CO., LTD.*
9F 5-2, Sunwha-dong Jung-gu Seoul, 100-130, Korea
TEL: +82 2 773 5623

SANYO DENKI *(Shenzhen)CO., LTD.*
Room 02-11, 2/F, Shenzhen International Chamber of CommerceTower, No.168 Fuhua 3 Road, Futian District, Shenzhen, China
TEL: +86 755 3337 3868

SANYO DENKI *(THAILAND)CO., LTD.*
388 Exchange Tower, 25th Floor, Unit 2501-1, Sukhumvit Road, Klongtoey, Klongtoey, Bangkok 10110 Thailand
TEL: +66 2261 8670

CATALOG No. S0832B016 '14.10 IT.

SANMOTION

3-PHASE STEPPING SYSTEMS

F3

Ver.3

SANYO DENKI

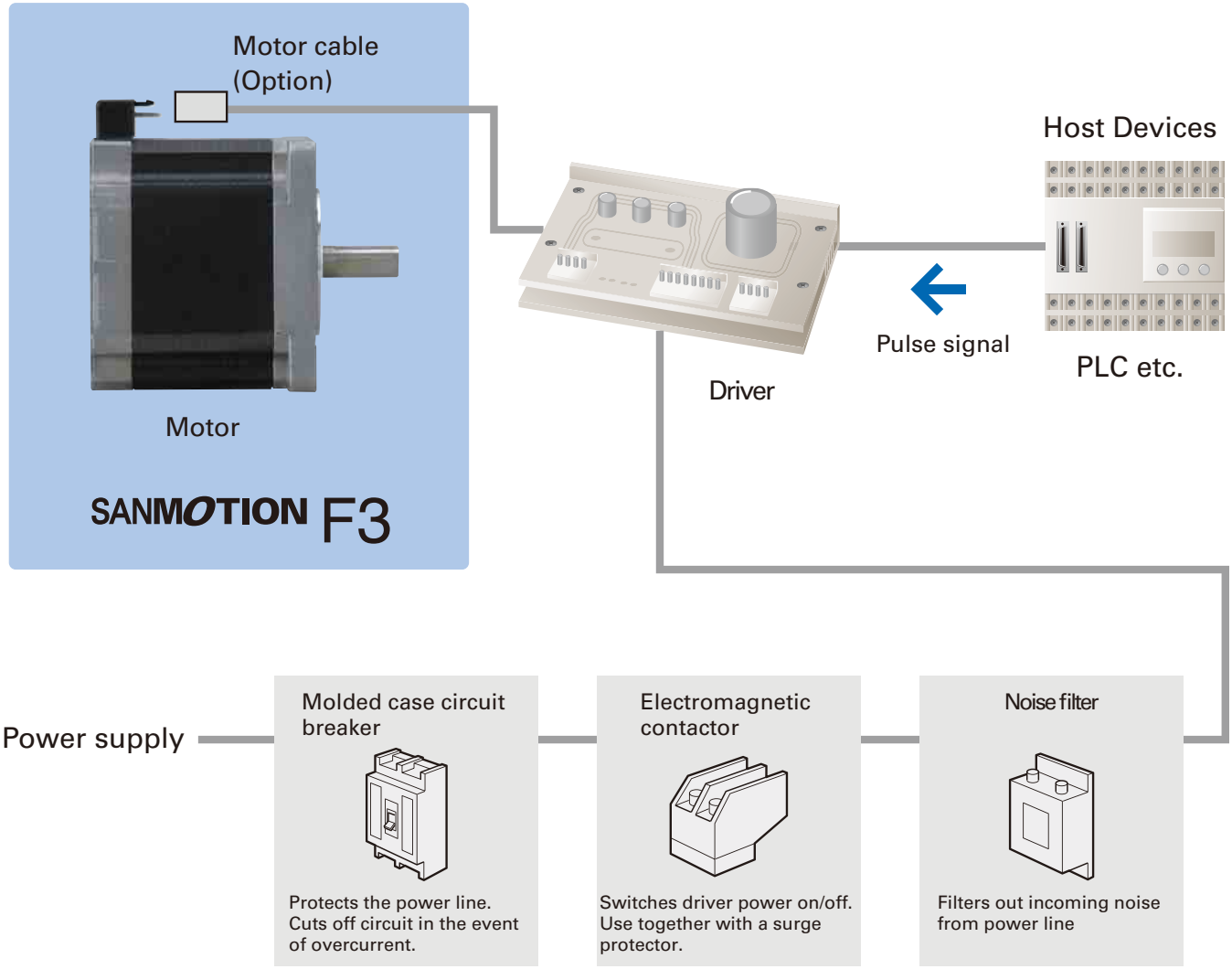
SANMOTION F3

3-PHASE STEPPING SYSTEMS

Stepping Motor Motor Size: 42 mm sq. to 60 mm sq.

SANMOTION F3 is a 3-phase stepping system that provides precise positioning with simple control. The typical basic step angle is 1.2˚, precisely controlled by pulse signals.

System Configuration



Set Model Configuration

Stepping Motor

Motor flange size	Basic step angle	Holding torque [N・m (oz・in) MIN.]	Model number	Page
42mm sq. (1.65inch sq.)	1.2˚	0.196 (27.75)	103H5332-03□0	P.4
		0.265 (37.53)	103H5333-03□0	P.4
50mm sq. (1.97inch sq.)	1.2˚	0.44 (62.31)	103H6332-03□0	P.5
		0.58 (82.13)	103H6333-03□0	P.5
56mm sq. (2.20inch sq.)	1.2˚	0.69 (97.71)	103H7332-03□0	P.6
		1.1 (155.77)	103H7333-03□0	P.6
60mm sq. (2.36inch sq.)	1.2˚	0.95 (134.53)	103H7832-03□0	P.7
		1.68 (237.90)	103H7833-03□0	P.7

Stepping Motor

42mm sq. (1.65inch sq.)

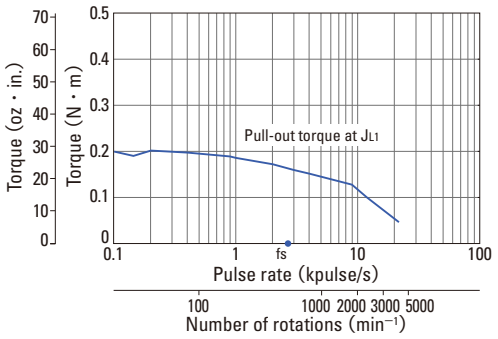
1.2° /step

Motor with Connector

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)
Single shaft	Double shaft	N・m (oz・in) MIN.	A /phase	Ω /phase	mH /phase	× 10^{-4}kg・m^2(oz・in^2)	kg (lbs)
103H5332-0340	**103H5332-0310**	0.196 (27.75)	3	0.84	0.5	0.053 (0.29)	0.3 (0.66)
103H5333-0340	**103H5333-0310**	0.265 (37.53)	3	0.94	0.5	0.065 (0.36)	0.38(0.84)

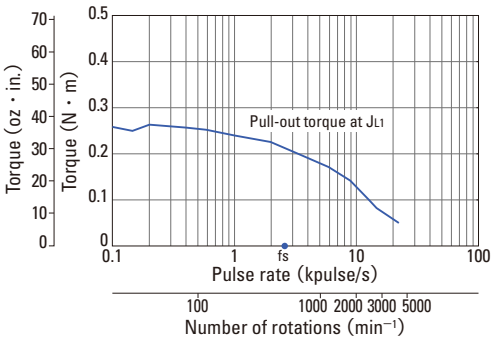
Pulse rate-torque characteristics

103H5332-0340
103H5332-0310



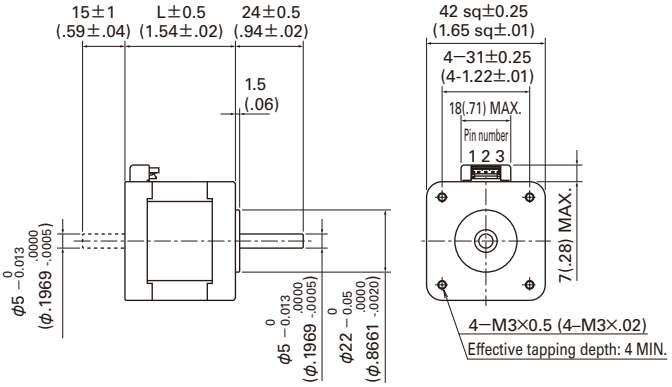
Constant current circuit
Source voltage : DC24V・operating current : 3 A/phase,
2-phase energization (full step)
[J_{L1}=0.94 × 10^{-4}kg・m^2 (5.14oz・in^2) use the rubber coupling.]

103H5333-0340
103H5333-0310

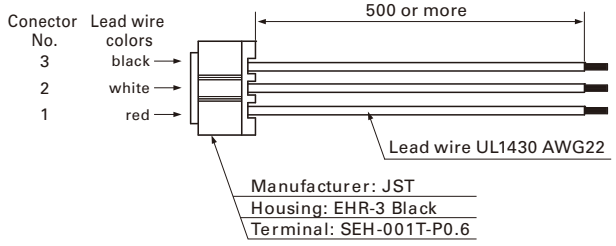


Constant current circuit
Source voltage : DC24V・operating current : 3 A/phase,
2-phase energization (full step)
[J_{L1}=0.94 × 10^{-4}kg・m^2 (5.14oz・in^2) use the rubber coupling.]

Dimensions [unit : mm(inch)]



Option: Motor cable Model No. : 4835611-1



Cable for 42 mm sq. motor (between motor and driver)

Set model number	Motor length(L) [mm(inch)]
103H5332-0340	39 (1.54 inch)
103H5332-0310	39 (1.54 inch)
103H5333-0340	48 (1.89 inch)
103H5333-0310	48 (1.89 inch)

The date are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer-side equipment.

50mm sq. (1.97inch sq.)

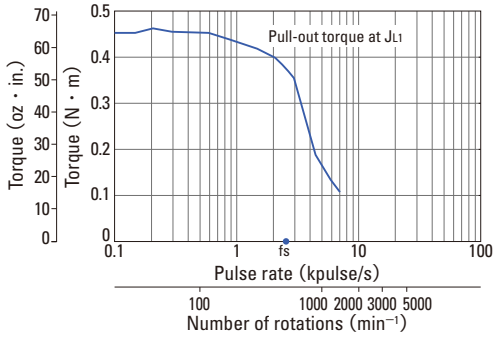
1.2° /step

Motor with Connector

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)
Single shaft	Double shaft	N・m (oz・in) MIN.	A/phase	Ω/phase	mH/phase	× 10^{-4}kg・m^2(oz・in^2)	kg (lbs)
103H6332-0340	**103H6332-0310**	0.44 (62.31)	3	1.3	1.6	0.12 (0.66)	0.5 (1.10)
103H6333-0340	**103H6333-0310**	0.58 (82.13)	3	1.6	1.6	0.17 (0.93)	0.65 (1.43)

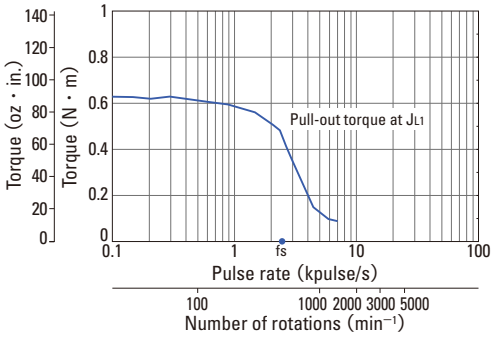
Pulse rate-torque characteristics

103H6332-0340
103H6332-0310



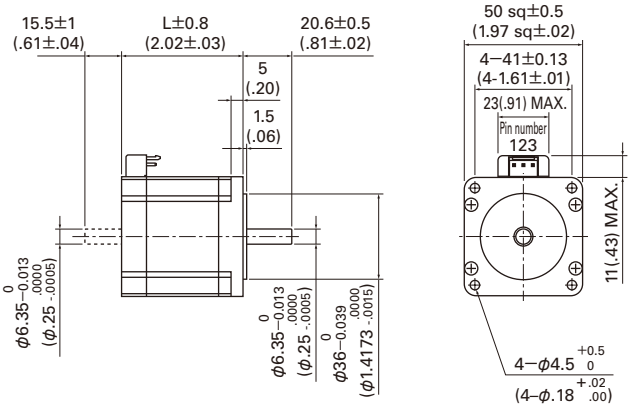
Constant current circuit
Source voltage : DC24V・operating current : 3 A/phase,
2-phase energization (full step)
[J_{L1}=0.94 × 10^{-4}kg・m^2 (5.14oz・in^2) use the rubber coupling.]

103H6333-0340
103H6333-0310



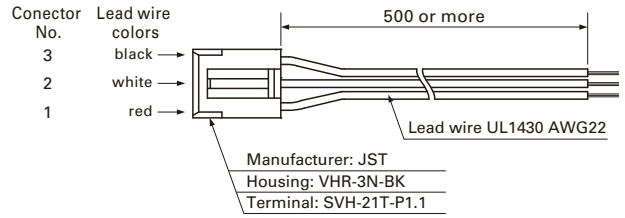
Constant current circuit
Source voltage : DC24V・operating current : 3 A/phase,
2-phase energization (full step)
[J_{L1}=0.94 × 10^{-4}kg・m^2 (5.14oz・in^2) use the rubber coupling.]

Dimensions [unit : mm(inch)]



Set model number	Motor length(L) [mm(inch)]
103H6332-0340	51.3 (2.02 inch)
103H6332-0310	51.3 (2.02 inch)
103H6333-0340	64.8 (2.55 inch)
103H6333-0310	64.8 (2.55 inch)

Option: Motor cable Model No. : 4837978-1



Cable for 50, 56, 60 mm sq. motor (between motor and driver)

The date are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer-side equipment.

56mm sq. (2.20inch sq.)

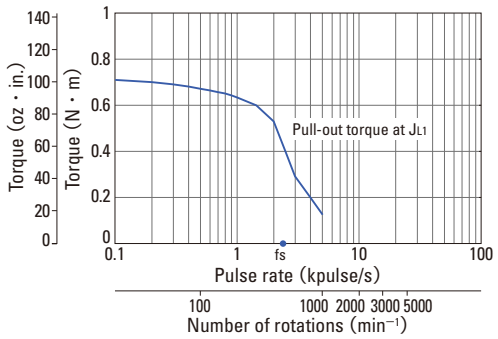
1.2° /step

Motor with Connector

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)
Single shaft	Double shaft	N・m (oz・in) MIN.	A/phase	Ω/phase	mH/phase	× 10^{-4}kg・m^2(oz・in^2)	kg (lbs)
103H7332-0340	**103H7332-0310**	0.69 (97.71)	3	1.4	1.8	0.21 (1.15)	0.65 (1.43)
103H7333-0340	**103H7333-0310**	1.1 (155.77)	3	1.7	2.4	0.36 (1.97)	0.98 (2.16)

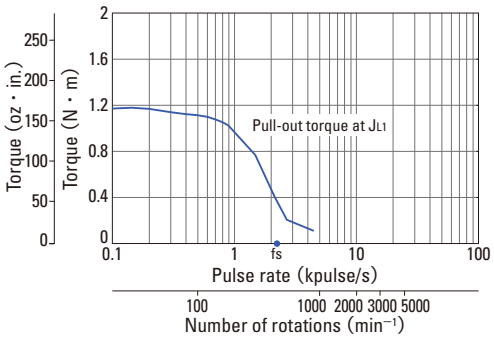
Pulse rate-torque characteristics

103H7332-0340
103H7332-0310



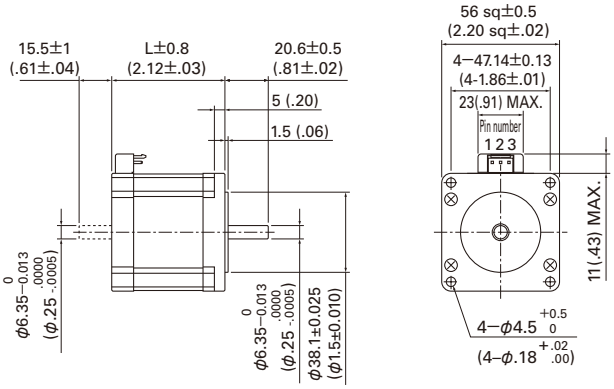
Constant current circuit
Source voltage : DC24V・operating current : 3 A/phase,
2-phase energization (full step)
[J_{L1}=0.94 × 10^{-4}kg・m^2 (5.14oz・in^2) use the rubber coupling.]

103H7333-0340
103H7333-0310



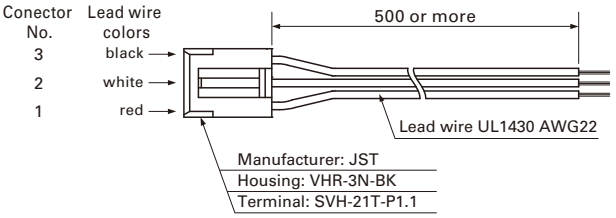
Constant current circuit
Source voltage : DC24V・operating current : 3 A/phase,
2-phase energization (full step)
[J_{L1}=2.6 × 10^{-4}kg・m^2 (14.22oz・in^2) use the rubber coupling.]

Dimensions [unit : mm(inch)]



Set model number	Motor length(L) [mm(inch)]
103H7332-0340	53.8 (2.12 inch)
103H7332-0310	53.8 (2.12 inch)
103H7333-0340	75.8 (2.98 inch)
103H7333-0310	75.8 (2.98 inch)

Option: Motor cable Model No. : 4837978-1



Cable for 50, 56, 60 mm sq. motor (between motor and driver)

The date are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer-side equipment.

60mm sq. (2.36inch sq.)

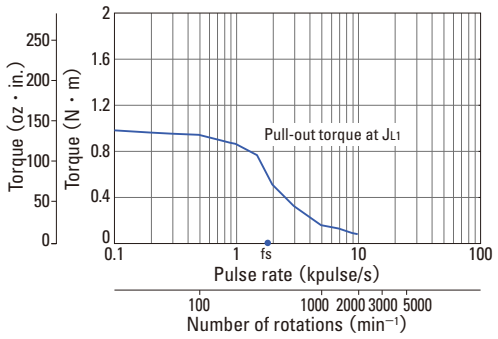
1.2° /step

Motor with Connector

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)
Single shaft	Double shaft	N・m (oz・in) MIN.	A/phase	Ω/phase	mH/phase	× 10^{-4}kg・m^2(oz・in^2)	kg (lbs)
103H7832-0340	**103H7832-0310**	0.95 (134.53)	3	1.5	1.8	0.4 (2.19)	0.78 (1.72)
103H7833-0340	**103H7833-0310**	1.68 (237.90)	3	2	3.2	0.84 (4.59)	1.34 (2.95)

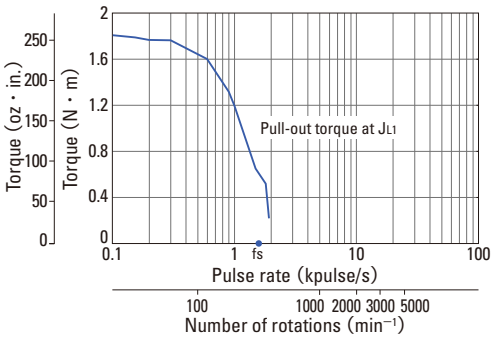
Pulse rate-torque characteristics

103H7832-0340
103H7832-0310



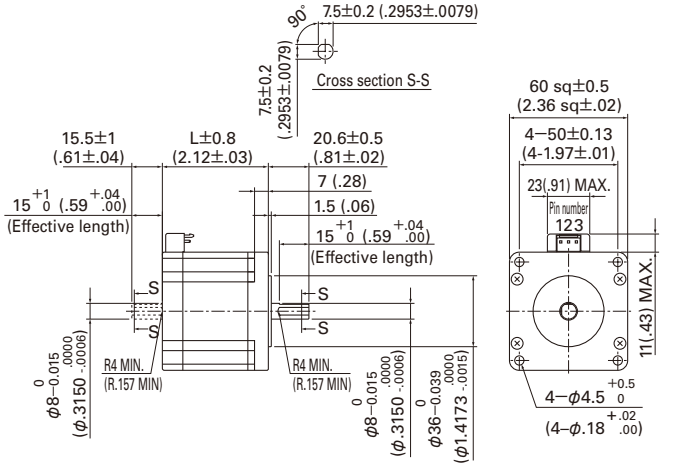
Constant current circuit
Source voltage : DC24V・operating current : 3 A/phase,
2-phase energization (full step)
[J_{L1}=2.6 × 10^{-4}kg・m^2 (14.22oz・in^2) use the rubber coupling.]

103H7833-0340
103H7833-0310



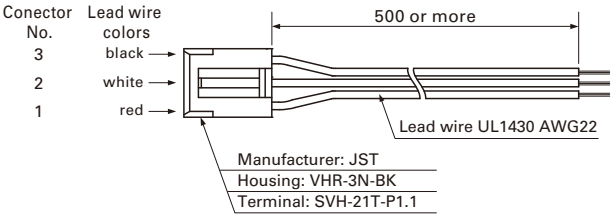
Constant current circuit
Source voltage : DC24V・operating current : 3 A/phase,
2-phase energization (full step)
[J_{L1}=7.4 × 10^{-4}kg・m^2 (40.46oz・in^2) use the rubber coupling.]

Dimensions [unit : mm(inch)]



Set model number	Motor length(L) [mm(inch)]
103H7832-0340	53.8 (2.12 inch)
103H7832-0310	53.8 (2.12 inch)
103H7833-0340	85.8 (3.98 inch)
103H7833-0310	85.8 (3.98 inch)

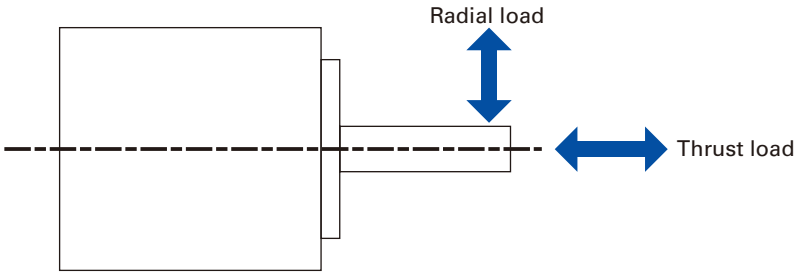
Option: Motor cable Model No. : 4837978-1



Cable for 50, 56, 60 mm sq. motor (between motor and driver)

The date are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer-side equipment.

Allowable radial / thrust load

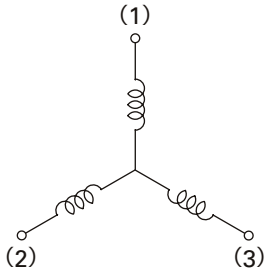


Frange size	Model number	Distance from end of shaft : mm (inch)				Thrust load : N (lbs)
		0 (0)	5 (.2)	10 (2.25)	15 (3.38)	
		Radial load : N(lbs)				
42mm sq. (1.65inch sq.)	103H533 □	25 (6)	30 (6)	38 (8)	53 (11)	10 (2.25)
50mm sq. (1.97inch sq.)	103H633 □	71 (15)	88 (19)	115 (25)	167 (37)	15 (3.37)
56mm sq. (2.2inch sq.)	103H733 □	65 (14)	80 (17)	105 (23)	153 (34)	15 (3.37)
60mm sq. (2.36inch sq.)	103H783 □	85 (19)	105 (23)	138 (31)	201 (44)	20 (4.50)

Internal connection and rotational direction

■ **Internal connection**

( ) Connector pin number



■ **Direction of motor rotate**

When DC-energized in the order below, the rotational direction must be counterclockwise viewed from the output axis side.

Type		Conector type pin number		
		(1)	(2)	(3)
Energization order	1	+	−	
	2	+		−
	3		+	−
	4	−	+	
	5	−		+
	6		−	+

General specifications

Model number	**103H533** □	**103H633** □	**103H733** □	**103H783** □
Ambient operation temperature	− 10 ～+ 50℃			
Storage temperature	− 20 ～+ 65℃			
Ambient operation humidity	20 ～ 90% RH (no condensation)			
Storage humidity	5 ～ 95% RH (no condensation)			
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 147 m/s^2 (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.			
Impact resistance	490m/s^2 of acceleration for 11 ms with half-sine wave applying three times for X, Y, and Z axes each, 18 times in total.			
Insulation class	Class B (+130℃)			
Withstand voltage	Without abnormality when applying 50/60 Hz, 1000 V AC (500 V AC for103H533 □) for 1 minute (leakage current 1 mA) between winding and frame at normal temperature and humidity.			
Insulation resistance	Not less then 100M Ω between winding and frame by DC500 V megger at normal temperature and hamidity.			
Protection grade	IP40			
Wiringtemperature increase	80 K MAX. (Based on Sanyo Denki standard.)			
Standing angle error	± 0.06°			
Axial play (Note 1)	0.075 mm (0.003 inch) MAX. Load : 4.4N (1 lbs)	0.075 mm (0.003 inch) MAX. Load : 9N (2 lbs)		
Radial play (Note 2)	0.075 mm (0.003 inch) MAX. Load : 4.4N (1lbs)			
Shaft runout	0.025mm (0.001 inch)			
Concentricity of mounting spigot relative to shaft	ϕ 0.05mm (0.002 inch)	ϕ 0.075mm (0.003 inch)		
Perpendicularity of mounting surface relative to shaft	0.1mm (0.004 inch)	0.075mm (0.003 inch)		

(Note1) Axial play: Shaft displacement under axial load.

(Note2) Radial play: Shaft displacement under radial load applied 1/3rd of the length from the end of the shaft.

Safety Consideration

The stepping motors are the products designed to be used for the general industrial devices.
When using those, pay enough attention to the following points.

- Read the instructions carefully before installation and assembly, to ensure correct usage. Manuals can be downloaded from our website.
- Refrain from modifying or processing the product in any way.
- Consult with the distributor or professional experts for placement or maintenance services of the product.
- In case of the following uses of the product, contact with us for the special care required to the operation, maintenance and management such as multiplexing the system, installing an emergency electric generator set, or so forth.
  - ❶ **Use for the medical devices concerned with a fatal accident.**
  - ❷ **Use for trains, elevators, and so forth that are likely to cause an accident resulting in injury, damage or death.**
  - ❸ **Use in the computer system highly influential to the social life or the public systems.**
  - ❹ **Use in other devices highly influential to maintaining the human safety or the public functions.**

In addition to the above, consult with us for use in such a vibration environment as automobile or transportation.
Make yourself knowledgeable and familiarize with the devices, safety issues and cautions before handling the product.

Indication by (Warning Label) on the product

Either or all of the following indications are given by the Warning Labels depending on the type of the stepping motor.

This label is stuck near the high voltage part such as the electrically charged or cover-protected section, warning that the place where it is likely to cause an electric shock.

This label is stuck near the GND terminals of the stepping motor for which grounding is required, suggesting that the terminals should be actually grounded.

This label is stuck for the stepping motor to which the power source is applied in the voltage exceeding the safety standard, drawing attention against the electric shock.

Safety ranks of the cautions

Following four ranks are provided.

Improper operations or use is most likely to result in serious injury or death.

Improper operations or use is likely to result in average or minor injury, or in property damage.

> In spite of the cautions with the ⚠CAUTION label, it may cause serious results.
> Either the contents of the labels is describing important cautions to be followed inevitably.

Indicates what shall not be done.

Indicates what shall be done.

DANGER

<General matters>

1. Do not use the product in an explosive, flammable or corrosive atmosphere, watery place or near a combustible material. Doing so may cause injury or fire.
2. Have a person with expert knowledge for performing the transportation ,placement,wiring, operation, maintenance or inspection of the product. Without such knowledge, it may cause an electric shock, injury or fire.
3. Do not work for wiring, maintenance servicing or inspection with the electric power on. Perform either of those five minutes after turning the power off, or otherwise, it may cause an electric shock.
4. When the protective functions of the product is activated, turn the power off immediately and eliminate the cause. If continuing the operation without eliminating the cause, the product may operate improperly and cause injury or a breakdown of the system devices.
5. Stepping motor may run out of order at the operating and stopping occasions, depending on the magnitude of the load. Put the product into use after confirming with the adequate trial test operation in the maximum load conditions that the product performs reliable operation. Doing otherwise may cause a breakdown of the system. (Should the product run out of order in the use to drive upward/downward, it may cause a fall of the load.)
6. Do not touch the internal parts. Doing so may cause an electric shock.

<Wiring>

7. Do not connect the stepping motor directly with the commercial power outlet. Doing so may cause an electric shock, injury or fire. The power shall be supplied to the stepping motor through the driving circuit.
8. Use the electric power source within the rated input voltage. Using otherwise may cause fire or an electric shock.
9. Connect the stepping motor to the ground. Using without grounding may cause an electric shock.
10. Do not harm, forcibly put a stress, or load a heavy article on the cable or get it caught between the articles. Doing so may cause an electric shock.
11. Perform wiring with the power cable as instructed by the wiring diagram. Doing otherwise may cause an electric shock or fire.

<Operation>

12. Be sure not to touch the rotating part of the stepping motor during its operation. Touching it may cause injury.
13. Neither reach or touch the electric terminals while electric power is on. Doing so may cause an electric shock.
14. Never disconnect any of the connectors while electric power is on. Doing so may cause an electric shock and corruption.

CAUTION

<General matters>

1. Do not use the driver or the stepping motor outside the specified conditions.
   Doing so may cause an electric shock, injury or fire.
2. Do not insert a finger or a thing into the opening of the product. Doing so may cause an electric shock, injury or fire.
3. Do not use the damaged driver or stepping motor. Doing so may cause injury, fire or the like.
4. Use the driver and stepping motor in the designated combination. Using otherwise may cause fire or a trouble.
5. Be careful that the temperature rises in the operating driver, stepping motor or peripheral devices. Failure to be careful may cause a burn.

<Unpacking>

6. Unpack while confirming the ceiling. Failure to do so may cause injury.
7. Confirm if the product is the one having been ordered. Installing an incorrect product may cause a breakdown.

<Wiring>

8. Do not perform measurement of the insulation resistance or withstand insulation voltage of the product. Doing so may cause a breakdown. Instead, contact with us for such inspection.
9. Perform wiring conforming to the technical standards of electric facility or the internal rule. Doing otherwise may cause burning or fire.
10. Ensure that wiring has been correctly done. Operating without correct wiring may cause the stepping motor to run out of control and result in injury.
11. Take insulation process for the attached condenser or the external resistance connection terminals. Failure to do so may cause an electric shock.

<Placement>

12. Do not climb or attach a heavy article on the product. Doing so may cause injury.
13. Neither block nor stuff the aspiration/exhaust vent with a foreign particle. Doing so may cause fire.
14. Follow the instructions for the direction to place. Failure to do so may cause a trouble.
15. Place the product with a great care so as to prevent from the danger such as a tumble or a turnover.
16. Mount the product on an incombustible material such as metal. Doing otherwise may cause fire.
17. Confirm the rotating direction before connecting with the mechanical device. Failure to do so may cause injury or a breakdown.
18. Do not touch the motor output spindle (including the key slot and gears) with a bare hand. Doing so may cause injury.

<Operation>

19. The stepping motor is not equipped with any protective device. Take protective measures using an over-current protective relay, a ground fault interrupter, a protective device from excess temperature, and an emergency stopping device. Failure to do so may cause injury or fire.
20. Do not touch the product for a period after the power is on or has been turned off, since the driver and stepping motor remain in the high temperature. Doing so may cause burns. Especially the temperature rises considerably of the stepping motor depending on the operating conditions. Use the motor on the condition so that its surface temperature becomes 100˚C or under
21. Stop the operation immediately when an emergency occurs. Failure to do so may cause an electric shock, injury or fire.
22. Do not change adjustment to an extreme, for such a change results in the unstable operation. Doing so may cause injury.
23. When conducting the trial operation, make the stepping motor fixed firmly, and confirm the operation by disconnecting with the mechanical system before connecting with it. Failure to do so may cause injury.
24. When the alarm has been activated, eliminate the cause and ensure the safety to resume operation. Failure to do so may cause injury.
25. When the electric power recovers after the momentary interruption, do not approach the devices because the system may re-start operation by itself. (Set the system so as to secure the safety even when it re-start on such occasion.) Failure to do so may cause injury.
26. Confirm that the electric power supply is all proper conforming to the specifications. Failure to do so may cause a trouble.
27. The brake mechanism of the motor with the electro-magnetic brake is to hold the movable section and the motor position. Do not use it as a safety measure, or doing so may cause the breakdown of the system.
28. Fix the key firmly when operating the motor with key individually. Failure to do so may cause injury.

<Maintenance services>

29. Be careful when performing maintenance services or inspection about the temperature which rises highly in the driver and stepping motor frame. Failure to do so may cause burns.
30. Contact with us for repair. If the product is disassembled by the user, it may put it out of action.

<Transportation>

31. Handle the product with care during transportation so as to prevent from the danger such as a tumble or a turnover.
32. Do not hold with the cable or the motor spindle. Doing so may cause a trouble or injury.

<Retirement>

33. When scrapping the stepping motor, treat it for the general industrial waste.

PROHIBITED

<Storage>

1. Avoid the place exposed to rain or water drops, or in an environment with hazardous gas or liquid for storing the product. Failure to do so may cause a trouble.

<Maintenance services>

2. Do not assemble or repair the product. Doing so may cause fire or an electric shock.

<General matters>

3. Do not remove the rating plate.

COMPULSORY

<Storage>

1. Store the product within the specified conservation temperature and humidity in the place not exposed to the sun beam.

<Operation>

2. Install an external emergency stop circuit to turn the power off for the instant halt of operation.
3. Put the product into operation in the specified ambient temperature and humidity.

<Transportation>

4. Excess loading of the product on the carrier may cause the load to fall in pieces. Follow the instructions given outside the package.

Inquiry Check Sheet

For more information regarding any products or services described here in, please contact your nearest office listed on the back of this catalog.

To SANYO DENKI Co.,LTD.

Date：

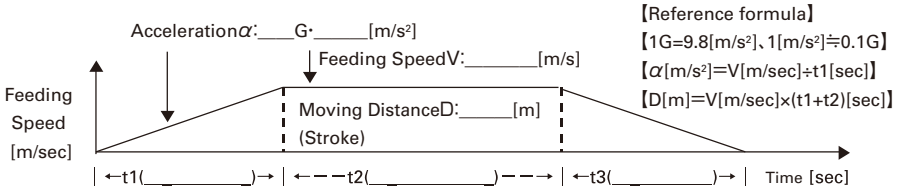
Company:

Department:

Name:

Tel: FAX:

E-mail:

	Item	Contents
❶	Name of target equipment	Equipment name, category (transport, processing, test, other)
❷	Name of servo axis	Axis name, axial mechanism (horizontal/vertical), brake mechanism (yes/no)
❸	Current condition of above axis	Manufacturer Name ( ) Series Name ( ) Motor Capacity ( ) Hydraulic, Mechanical, or New System ( )
❹	Positioning accuracy	± mm･± μm
❺	Operation pattern	 【Reference formula】 【1G=9.8[m/s²]、1[m/s²]≒0.1G】 【α[m/s²]=V[m/sec]÷t1[sec]】 【D[m]=V[m/sec]×(t1+t2)[sec]】
❻	Mechanism	Ball-screw/screw-rotation type (horizontal/vertical), ball-screw/nut-rotation type (horizontal/vertical), rack and pinion (horizontal/vertical), belt/chain (horizontal/vertical), rotary table, roll feed, other
❼	Mechanical structure	WT(table mass) kg　WL(work mass) kg　WA(mass of other drive parts) kg WR(rack mass) kg　WB(belt/chain mass) kg　WC(counterbalance mass) kg Fa(external force axial direction) N　Fb(ball-screw preload) N　T(roll pushing force) N Dr1(drive-side roll diameter) mm　Dr2(follower-side roll diameter) mm Lr1(drive-side roll length) mm　Lr2(follower-side roll length) mm　G(reduction ratio) JG(speed-reducer inertia) kg･m²　JC(coupling inertia) kg･m² JN(nut inertia) kg･m²　JO(other motor-axis conversion inertia) kg･m² Db(ball-screw diameter) mm　Lb(ball-screw axial length) mm　Pb(ball -screw lead) mm Dp(pinion/pulley diameter) mm　Lp(pinion axial length) mm　tp(pully thickness) mm Dt(table diameter) mm　Dh(table-support dianeter) mm　LW(load shift from axis) mm Ds(table shaft diameter) mm　Ls(table shaft length) mm ρ(specific gravity of ball-screw/pinion/pulley/table-shaft material) kg･cm³ μ(friction coefficient between sheet and shiliding-surface/support-section/roll)　ρ1(specific gravity of roll-1 material) kg／cm³ ρ2(specific gravity of roll-2 material) kg／cm³　κ(internal friction coefficient of preload nut) η(mechanical efficiency)　JL(load inertia of motor-axis conversion) kg･m² TF(friction torque of motor axis conversion) N･m　Tu(imbalance torque of motor axis conversion) N･m
❽	Speed reducer	Customer-provided (／)･Sanyo denki standard(planet/spur/no-backlash-planet ／) other(／)
❾	Encoder type	Encoder type specified (yes / no) Yes:(Wiring saving incremental encoder, battery backup absolute encoder, absolute encoder for incremental system, battery-less absolute encoder) Resolution( )
❿	Input format	Position , velocity , torque , other ( )
⓫	Host equipment (controller)	Sequencer , laptop , customer-developed product , Sanyo dennki-provided , other ( )
⓬	Usage environment and other requirements	Cutting , clean-room use , anti-dust measures , other ( )
⓭	Estimated production	Single product: ( ) units/mouth ( ) units/year
⓮	Development schedule	Prototype period: ( )Year ( ) Month Production period: ( )Year ( ) Month
⓯	Various measures	Related documentation (already submitted; send later by mail) Visit/PR desired (yes / no) Meeting desired (yes / no)
⓰	Miscellaneous (questions, pending problems, unresolved issues, etc.)	

■ Precautions For Adoption

Failure to follow the precautions on the right may cause moderate injury and property damage, or in some circumstances,could lead to a serious accident. Always follow all listed precautions.

⚠ Cautions

- Read the accompanying Instruction Manual carefully prior to using the product.
- If applying to medical devices and other equipment affecting people's lives, please contact us beforehand and take appropriate safety measures.
- If applying to equipment that can have significant effects on society and the general public, please contact us beforehand.
- Do not use this product in an environment where vibration is present, such as in a moving vehicle or shipping vessel.
- Do not perform any retrofitting, re-engineering, or modification to this equipment.
- The products presented in this catalog are meant to be used for general industrial applications. If using for special applications related to aviation and space, nuclear power, electric power, submarine repeaters, etc., please contact us beforehand.

*For any question or inquiry regarding the above, contact our Sales Department.

http://www.sanyodenki.com

SANYO DENKI CO., LTD.
1-15-1, Kita-Otsuka, Toshima-ku, Tokyo 170-8451, Japan
Phone: +81 3 3917 5157

SANYO DENKI *AMERICA, INC.*
468 Amapola Avenue Torrance, CA 90501 U.S.A.
Phone: +1 310 783 5400

SANYO DENKI *EUROPE SA.*
P.A. Paris Nord Ⅱ, 48 Allée des Erables-VILLEPINTE, BP.57286, F-95958 ROISSY CDG Cedex, France
Phone: +33 1 48 63 26 61

SANYO DENKI *GERMANY GmbH*
Frankfurter Strasse 92, 65760 Eschborn, Germany
Phone: +49 6196 76113 0

SANYO DENKI *KOREA CO., LTD.*
9F 5-2, Sunwha-dong Jung-gu Seoul, 100-130, Korea
Phone: +82 2 773 5623

SANYO DENKI *SHANGHAI CO., LTD.*
Rm2107-2109, Bldg A, Far East International Plaza, No.319, Xianxia Rd., Shanghai, 200051, China
Phone: +86 21 6235 1107

SANYO DENKI *TAIWAN CO., LTD.*
Room 1208, 12F, No.96 Chung Shan N, Rd., Sec.2, Taipei 104, Taiwan, R.O.C.
Phone: +886 2 2511 3938

SANYO DENKI *(H.K.)CO., LIMITED*
Room 2305, 23/F, South Tower, Concordia Plaza, 1 Science Museum Rd., TST East, Kowloon, Hong Kong
Phone: +852 2312 6250

SANYO DENKI *SINGAPORE PTE. LTD.*
10, Hoe Chiang Road, #14-03A/04, Keppel Towers, Singapore 089315
Phone: +65 6223 1071

*Remarks : Specifications Are Subject To Change Without Notice.

CATALOG NO. S0833B004 '12.10.IT

SANMOTION

5-PHASE STEPPING SYSTEMS

F5

Ver.5.1

SANYO DENKI

SANMOTION F5

5-PHASE STEPPING SYSTEMS

- AC input Set model — Micro step
- DC input Set model — Micro step, full step / half step
- AC input Driver
- DC input Driver
- Stepping Motor — 28mm sq. to 60mm sq. , ϕ60mm to ϕ106mm
- Linear Actuator Stepping Motor,
  Stepping Motor for vacuum environment

Index

Features ····· P. 4
Line Up ····· P. 5
Lineup Details ····· P. 6
AC input Set model Micro step ····· P. 8
- System Configuration ····· P. 8
- Model number convention ····· P. 9
- Set Model Configuration ····· P. 10
- Optional Accessories ····· P. 11
- Specifications Standard model ····· P. 12
- Specifications CE / UL model ····· P. 15
- Specifications Low-backlash gear model ····· P. 18
- Specifications Harmonic gear model ····· P. 23
- Specifications Electromagnetic brake model ·· P. 25
- Motor specifications ····· P. 28
- Driver specifications ····· P. 29
- Driver Controls and Connectors ····· P. 30
- Connections and Signals ····· P. 31

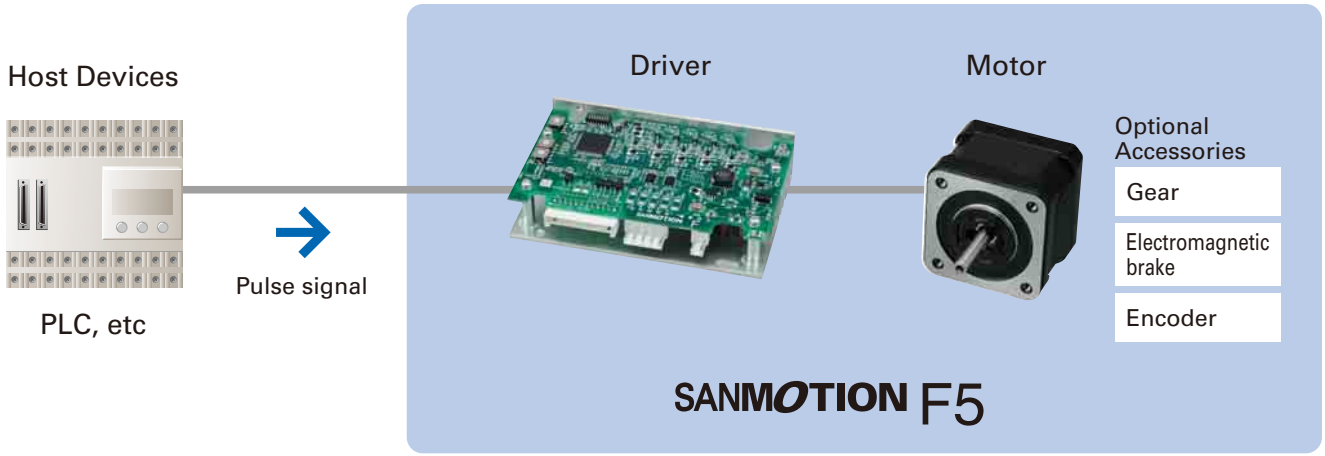
DC input Set model Micro step ····· P. 34
- System Configuration ····· P. 34
- Model number convention ····· P. 35
- Set Model Configuration ····· P. 36
- Optional Accessories ····· P. 37
- Specifications Standard model ····· P. 38
- Specifications Low-backlash gear model ····· P. 41
- Specifications Spur gear model ····· P. 46
- Specifications Harmonic gear model ····· P. 48
- Specifications Electromagnetic brake model ·· P. 51
- Motor specifications ····· P. 53
- Driver specifications ····· P. 54
- Driver Controls and Connectors ····· P. 55
- Connections and Signals ····· P. 56

DC input Set model Full/half step ····· P. 60
- System Configuration ····· P. 60
- Model number convention ····· P. 61
- Set Model Configuration ····· P. 62
- Specifications Standard model ····· P. 63
- Specifications Low-backlash gear model ····· P. 66
- Specifications Spur gear model ····· P. 71
- Specifications Harmonic gear model ····· P. 73
- Specifications Electromagnetic brake model ·· P. 76
- Motor specifications ····· P. 78
- Driver specifications ····· P. 79
- Driver Controls and Connectors ····· P. 80
- Connections and Signals ····· P. 81

Stepping Motor ····· P. 84
Linear Actuator Stepping Motor ····· P. 95
Stepping Motor for vacuum environment ·· P. 96
Dimensions ····· P. 97
Safety Consideration ····· P. 107

SANMOTION F5
5-PHASE STEPPING SYSTEMS

SANMOTION F5 is a five-phase stepping system that provides precise positioning with simple control. The typical basic step angle is 0.72˚, precisely controlled by pulse signals.



Features

- Small driver and motor, yet high torque.
- Fast response provides shorter system cycle time for repetitive operations.
- Holding torque maintains the stop position when turning on power. Electromagnetic brake models maintain position even with power off.
- Automicro function For DC input, only specific model (micro-step)
  Smooth drive is provided even with coarse resolution of one division (full-step) or two (half-step) settings. Vibration suppression is executed internally and independently from the controller.
- Microstepping system For DC input, only specific model (micro-step)
  Multiples of the 0.72˚ basic step angle resolution can be set in 16 steps from 1 to 250 divisions. (0.72˚ to 0.00288˚ / pulse)
  Provides smooth drive with low vibration.

Safety standards

All SANMOTION F5 drivers are specified according to standards, and comply with UL and CE (EN standards).
You can select driver/motor sets that comply UL and CE standards.

Line up

Motor/driver sets are conveniently available in either AC or DC models.
DC models include micro-step and full-/half-step drivers.
Beside the set models, stepping motors can be purchased independently.
The product line includes linear actuator stepping motors with straight line drives, and vacuum-compatible stepping motors.

Set model

AC input (Micro step)

Standard model

This is the basic model AC driver/motor set.

Motor size
42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/
⌀86mm (⌀3.39inch)/⌀106mm (⌀4.17inch)

CE / UL model

This model motor/driver set complies with CE and UL standards.

Motor size
42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/
⌀86mm (⌀3.39inch)/⌀106mm (⌀4.17inch)

Low-backlash gear model

This set employs low backlash conically hobbed gears to engage the output stage of the speed reduction mechanism.

Motor size 42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/⌀86mm (⌀3.39inch)
Reduction gear ratios 1:3.6 / 1:7.2 / 1:10 / 1:20 / 1:30 / 1:36

Harmonic gear model

This model employs harmonic gears for up to 1:100 resolution.

Motor size 42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/⌀86mm (⌀3.39inch)
Reduction gear ratios 1:30 / 1:50 / 1:100

Electromagnetic brake model

This set utilizes a non-excitation electromagnetic brake to maintain position in vertical load applications and hold load even during power off.

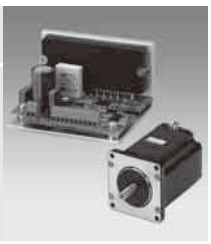
Motor size 42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/⌀86mm (⌀3.39inch)

DC input (42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.))

Standard model

This is the basic model DC driver/motor set.

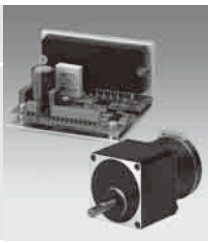
Motor size
28mm sq. (1.10inch sq.)/42mm sq. (1.65inch sq.)/
60mm sq. (2.36inch sq.)/⌀86mm (⌀3.39inch)



Low-backlash gear model

This set employs low backlash conically hobbed gears to engage the output stage of the speed reduction mechanism.

Motor size 42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/⌀86mm (⌀3.39inch)
Reduction gear ratios 1:3.6 / 1:7.2 / 1:10 / 1:20 / 1:30 / 1:36



Spur gear model

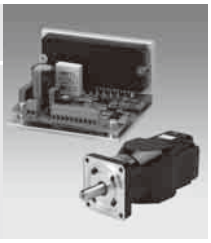
This set employs a spur gear in the speed reduction mechanism.

Motor size 28mm sq. (1.10inch sq.)
Reduction gear ratios 1:3.6 / 1:7.2 / 1:10 / 1:20 / 1:30 / 1:50

Harmonic gear model

This model employs harmonic gears for up to 1:100 resolution.

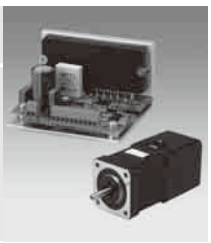
Motor size 28mm sq. (1.10inch sq.)/42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/⌀86mm (⌀3.39inch)
Reduction gear ratios 1:30 / 1:50 / 1:100



Electromagnetic brake model

This set utilizes a non-excitation electromagnetic brake to maintain position in vertical load applications and hold load even during power off.

Motor size 42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/⌀86mm (⌀3.39inch)



Stepping Motor

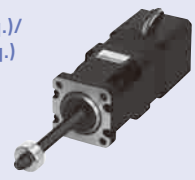
When ordering a motor only, select from a variety of motor sizes.
Separate driver is required.

Motor size
28mm sq. (1.10inch sq.)/
39mm sq. (1.54inch sq.)/
42mm sq. (1.65inch sq.)/
50mm sq. (1.97inch sq.)/
60mm sq. (2.36inch sq.)/
⌀60mm (⌀2.36inch)/
⌀86mm (⌀3.39inch)/⌀106mm (⌀4.17inch)

Linear Actuator Stepping Motor

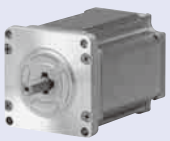
This motor employs an integrated ball screw for linear motion.
Separate driver is required.

Motor size
42mm sq. (1.65inch sq.)/
60mm sq. (2.36inch sq.)



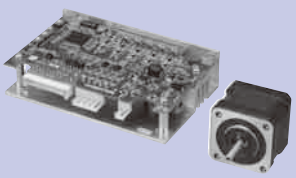
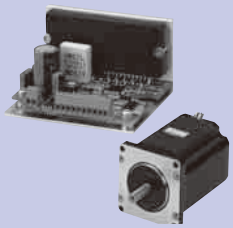
Stepping motor for vacuum environment

This motor is customized for use in systems operating in vacuum environments.
Separate driver is required.



Lineup Details

Set model P.8 -

Series		AC input Set model Micro step	DC input Set model Micro step	DC input Set model Full / half step
				
Power supply		Single phase AC100V to 230V	DC24V/48V	DC24V/36V
Number of divisions		1 to 250	5-phase mode : 1 to 250 2-phase mode : 0.4 to 102.4	1 (Full step), 2 (Half step)
Basic step angle		0.72° to 0.00288° /pulse	5-phase mode : 0.72° to 0.00288° /pulse 2-phase mode : 1.8° to 0.00703125° /pulse	0.72° to 0.36° /pulse
Stepping motor connection method※		pentagon connection	New pentagon connection	New pentagon connection
Model types and corresponding motor sizes (reduction ratios in parentheses)	Standard	42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/φ86mm (φ3.39inch)/ φ106mm (φ4.17inch)	28mm sq. (1.10inch sq.)/42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/φ86mm (φ3.39inch)	28mm sq. (1.10inch sq.)/42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/φ86mm (φ3.39inch)
	CE・UL	42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/φ86mm (φ3.39inch)/ φ106mm (φ4.17inch)	—	—
	Low-backlash gear model	42mm sq.(1.65inch sq.)/60mm sq. (2.36inch sq.)/φ86mm (φ3.39inch) (1:3.6 / 1:7.2 / 1:10 / 1:20 / 1:30 / 1:36)	42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/φ86mm (φ3.39inch) (1:3.6 / 1:7.2 / 1:10 / 1:20 / 1:30 / 1:36)	42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/φ86mm (φ3.39inch) (1:3.6 / 1:7.2 / 1:10 / 1:20 / 1:30 / 1:36)
	Spur gear model	—	28mm sq. (1.10inch sq.) (1:3.6 / 1:7.2 / 1:10 / 1:20 / 1:30 / 1:50)	28mm sq. (1.10inch sq.) (1:3.6 / 1:7.2 / 1:10 / 1:20 / 1:30 / 1:50)
	Harmonic gear model	42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/φ86mm (φ3.39inch) (1:30 / 1:50 / 1:100)	28mm sq. (1.10inch sq.)/42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/φ86mm (φ3.39inch) (1:30 / 1:50 / 1:100)	28mm sq. (1.10inch sq.)/42mm sq. (1.65inch sq.)/60mm sq. (2.36inch sq.)/φ86mm (φ3.39inch) (1:30 / 1:50 / 1:100)
	Electromagnetic brake model	42mm sq. (1.65inch sq.)/ 60mm sq. (2.36inch sq.)/ φ86mm (φ3.39inch)	42mm sq. (1.65inch sq.)/ 60mm sq. (2.36inch sq.)/ φ86mm (φ3.39inch)	42mm sq. (1.65inch sq.)/ 60mm sq. (2.36inch sq.)/ φ86mm (φ3.39inch)
Control method		Pulse input・Open loop	Pulse input・Open loop	Pulse input・Open loop
Set model configuration items		Driver・Motor・Connector	Driver・Motor・ DC power cable (1m) Motor cable (1m) I/O signal cable (1m)	Driver・Motor
Optional Accessories		AC power cable (1 to 10m) Motor cable (1 to 10m) I/O signal cable (1 to 2m)	Regeneration resistor	—
Page	System Configuration	P.8	P.34	P.60
	Set Model Configuration	P.10	P.36	P.62
	Specifications and Characteristics	P.12 to 27	P.38 to 52	P.63 to 77
	Motor specifications・Driver specifications・Safety standards	P.28 to 29	P.53 to 54	P.78 to 79
	Dimensions	P.97 to 105	P.97 to 105	P.97 to 105

Our stepping motors generally support one of two connection methods, called "Pentagon" and "New Pentagon."
See each motor's specifications for details.

Stepping Motor P.84 -

Connection Method: Pentagon

Basic step angle	Motor size	Holding torque (N・m)	Model Number	Page	
				Specifications and Characteristics	Dimensions
0.36°	39mm sq. (1.54inch sq.)	0.078 to 0.167	103-45 □□ -70 □ 0	P.84	P.97
0.45°	ϕ60mm (ϕ2.36inch)	0.91	103-7566-70 □ 1	P.85	P.99
0.72°	28mm sq. (1.10inch sq.)	0.041 to 0.085	SH528 □ - □ 0 □ 1	P.86	P.97
0.72°	42mm sq. (1.65inch sq.)	0.127 to 0.255	103H55 □□ -70 □ 0	P.87	P.97
0.72°	50mm sq. (1.97inch sq.)	0.225 to 0.39	103H650 □ - □ 0 □ 1	P.88	P.98
0.72°	60mm sq. (2.36inch sq.)	0.65 to 1.86	103H785 □ - □ 0 □ 1	P.89	P.98
0.72°	ϕ60mm (ϕ2.36inch)	0.46 to 1.568	103H752 □ - □ 0 □ 1	P.90	P.99
0.72°	ϕ86mm (ϕ3.39inch)	2.06 to 6.17	103H858 □ - □ 0 □ 1	P.91	P.99
0.72°	ϕ106mm (ϕ4.17inch)	10.8 to 16	103H8958 □ - □ 0 □ 1	P.92	P.100

Linear Actuator Stepping Motor P.95 -

Connection Method: New Pentagon

Motor size	Brake	Rated current (A/phase)	Thrust (N)	Speed (mm/s)	Model number	Page	
						Specifications and Characteristics	Dimensions
42mm sq. (1.65inch sq.)	Without	0.75	370	48	SL5421-7241	P.95	P.106
	With	0.75	370	48	SL5421-72XB41	P.95	P.106
60mm sq. (2.36inch sq.)	Without	1.4	450	64	SL5601-8241	P.95	P.106
	With	1.4	450	64	SL5601-82XB41	P.95	P.106

Stepping motor for vacuum environment P.96

This motor is customized for use in systems operating in vacuum environments.
Supports wide pressure range for low, high and ultra-high vacuums.

・Encoder-equipped motors are available upon request.

AC input Set model
Micro step

Set Model Configuration ▶ P.10
Specifications · Characteristics ▶ P.12 to 27
Motor specifications ▶ P.28 Driver specifications ▶ P.29
Motor dimensions ▶ P.97 to 104 Driver dimensions ▶ P.105

Features

- The auto-micro function provides low vibration and smooth drive even with coarse resolution setting of one or two divisions (full-/half-step), and supports micro steps of 250 divisions.
- Status and alarms are displayed instantly on the driver's two-digit alphanumeric LEDs.

Set model configuration items

Driver

Model number : FS1W075P00
Power supply : Single phase AC100V to 230V

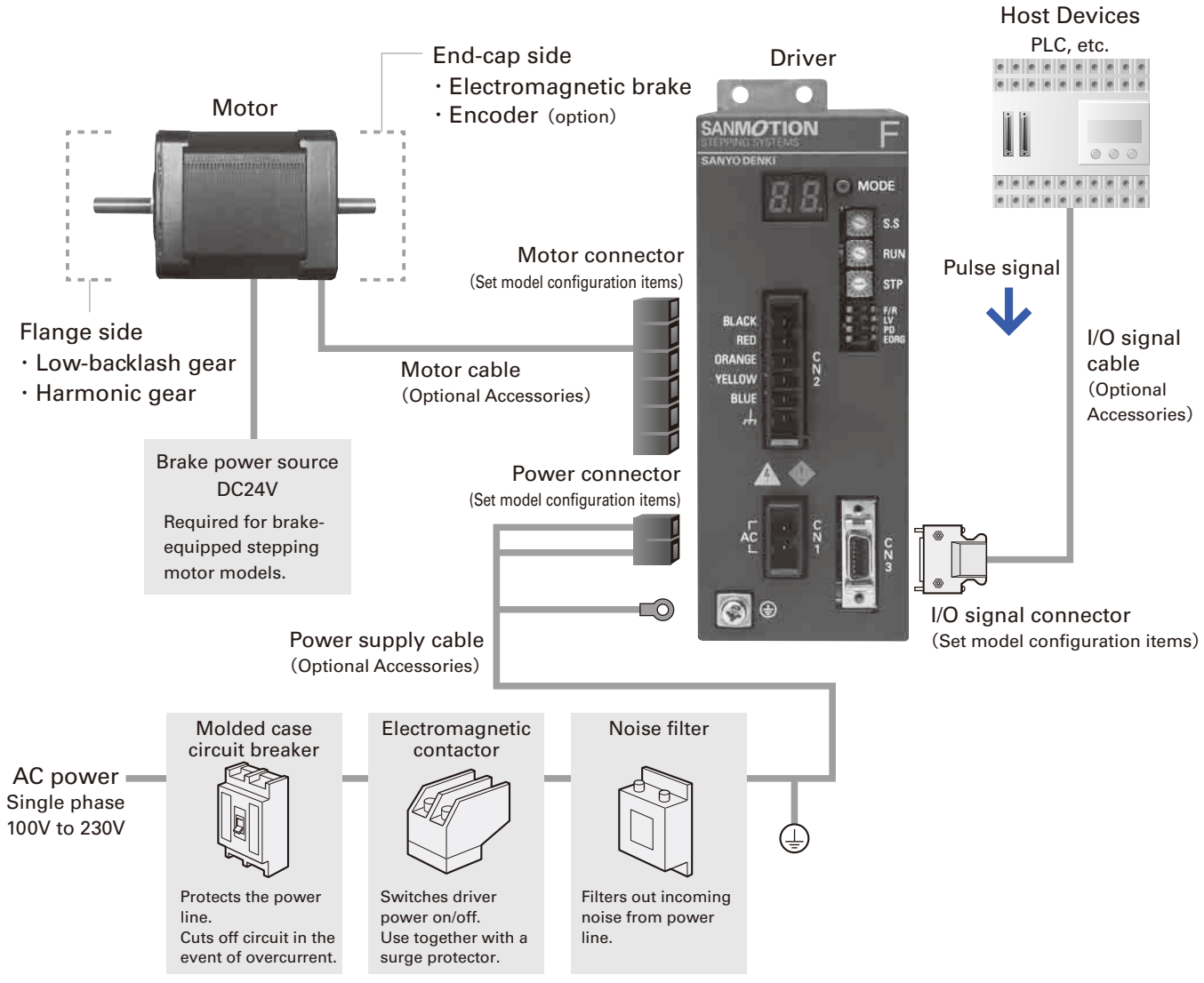
Motor CE/UL models comply with the respective safety standards.

Motor size : 42mm sq. (1.65inch sq.), 60mm sq. (2.36inch sq.), ϕ86mm (ϕ3.39inch), ϕ106mm (ϕ4.17inch)

Connector Power supply, Input/output signal, Motor

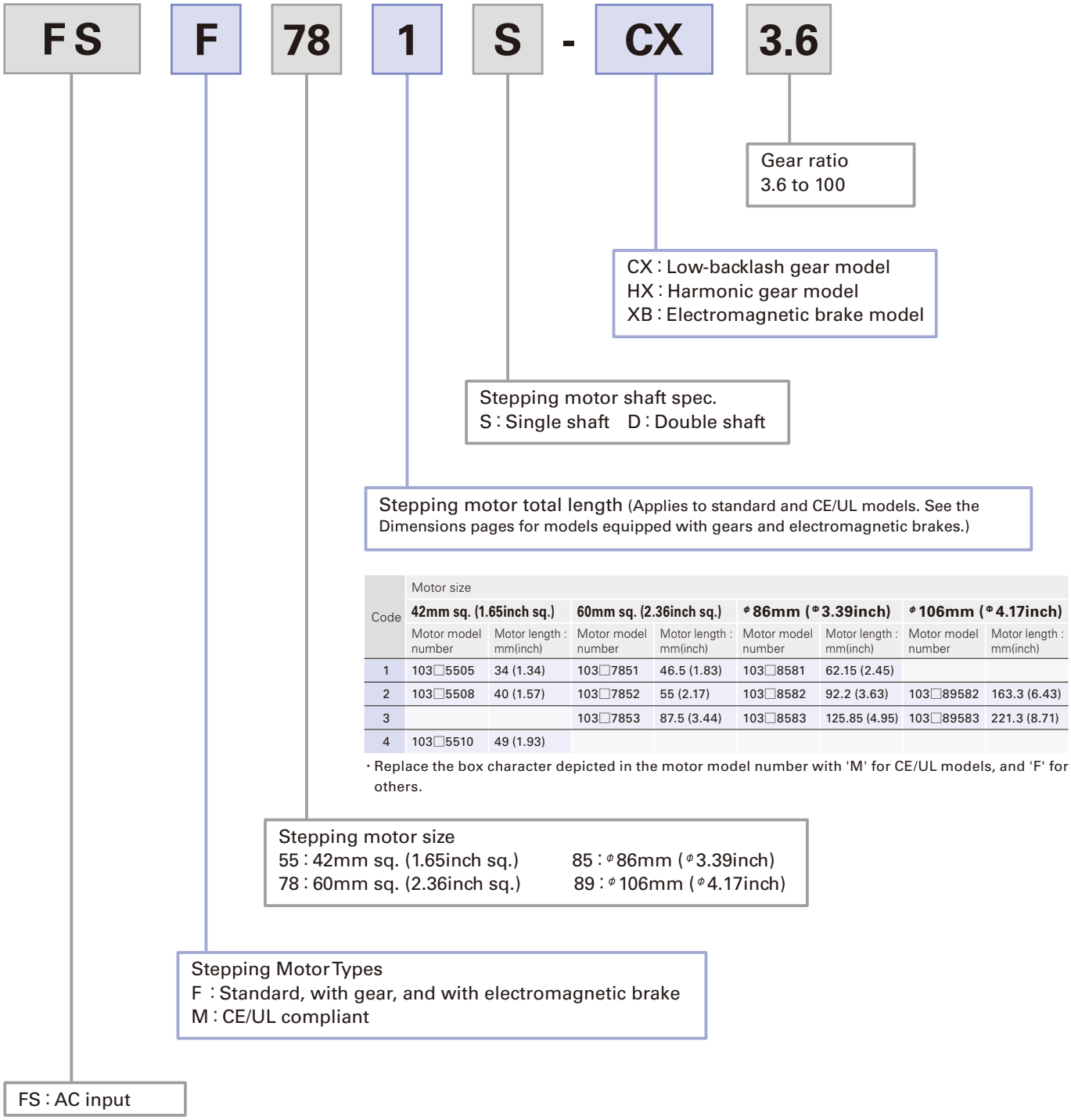
- Instruction manuals can be downloaded from our website.
- Cables for motor power and input/output signals (with connectors) are sold as options.

System configuration



Model number convention

Example: The model number of the set with an AC driver and motor model 103F7851-70CXA4 is composed as follows. This motor is specified as 60mm sq. (2.36inch sq.) and 92mm (3,62inch) long (motor + gear), single shaft, with low backlash gears.



Code	Motor size							
	42mm sq. (1.65inch sq.)		60mm sq. (2.36inch sq.)		ϕ86mm (ϕ3.39inch)		ϕ106mm (ϕ4.17inch)	
	Motor model number	Motor length : mm(inch)	Motor model number	Motor length : mm(inch)	Motor model number	Motor length : mm(inch)	Motor model number	Motor length : mm(inch)
1	103□5505	34 (1.34)	103□7851	46.5 (1.83)	103□8581	62.15 (2.45)		
2	103□5508	40 (1.57)	103□7852	55 (2.17)	103□8582	92.2 (3.63)	103□89582	163.3 (6.43)
3			103□7853	87.5 (3.44)	103□8583	125.85 (4.95)	103□89583	221.3 (8.71)
4	103□5510	49 (1.93)						

・Replace the box character depicted in the motor model number with 'M' for CE/UL models, and 'F' for others.

Set Model Configuration

This is a set comprising a driver, motor and connectors.

AC Input Driver Model No. : FS1W075P00

Basic step angle : 0.72° Rated current : 0.75A/phase

Model	Motor size	Single shaft			Double shaft			Page	
		Set model number	Set model configuration items		Set model number	Set model configuration items			
			Motor model number	Connector number (note)		Motor model number	Connector number (note)	Specifi-cations	Dimen-sions
Standard model	42mm sq. (1.65inch sq.)	**FSF551S**	103F5505-7041	PM-AP-065	**FSF551D**	103F5505-7011	PM-AP-065	P.12	P.97
		FSF552S	103F5508-7041	PM-AP-065	**FSF552D**	103F5508-7011	PM-AP-065	P.12	P.97
		FSF554S	103F5510-7041	PM-AP-065	**FSF554D**	103F5510-7011	PM-AP-065	P.12	P.97
	60mm sq. (2.36inch sq.)	**FSF781S**	103F7851-7041	PM-AP-064	**FSF781D**	103F7851-7011	PM-AP-064	P.12	P.98
		FSF782S	103F7852-7041	PM-AP-064	**FSF782D**	103F7852-7011	PM-AP-064	P.13	P.98
		FSF783S	103F7853-7041	PM-AP-064	**FSF783D**	103F7853-7011	PM-AP-064	P.13	P.98
	ϕ86mm (ϕ3.39inch)	**FSF851S**	103F8581-7041	PM-AP-064	**FSF851D**	103F8581-7011	PM-AP-064	P.13	P.99
		FSF852S	103F8582-7041	PM-AP-064	**FSF852D**	103F8582-7011	PM-AP-064	P.13	P.99
		FSF853S	103F8583-7041	PM-AP-064	**FSF853D**	103F8583-7011	PM-AP-064	P.14	P.99
	ϕ106mm (ϕ4.17inch)	**FSF892S**	103F89582-7041	PM-AP-063	**FSF892D**	103F89582-7011	PM-AP-063	P.14	P.100
		FSF893S	103F89583-7041	PM-AP-063	**FSF893D**	103F89583-7011	PM-AP-063	P.14	P.100
CE / UL model	42mm sq. (1.65inch sq.)	**FSM551S**	103M5505-7041	PM-AP-065	**FSM551D**	103M5505-7011	PM-AP-065	P.15	P.97
		FSM552S	103M5508-7041	PM-AP-065	**FSM552D**	103M5508-7011	PM-AP-065	P.15	P.97
		FSM554S	103M5510-7041	PM-AP-065	**FSM554D**	103M5510-7011	PM-AP-065	P.15	P.97
	60mm sq. (2.36inch sq.)	**FSM781S**	103M7851-7041	PM-AP-064	**FSM781D**	103M7851-7011	PM-AP-064	P.15	P.98
		FSM782S	103M7852-7041	PM-AP-064	**FSM782D**	103M7852-7011	PM-AP-064	P.16	P.98
		FSM783S	103M7853-7041	PM-AP-064	**FSM783D**	103M7853-7011	PM-AP-064	P.16	P.98
	ϕ86mm (ϕ3.39inch)	**FSM851S**	103M8581-7041	PM-AP-064	**FSM851D**	103M8581-7011	PM-AP-064	P.16	P.99
		FSM852S	103M8582-7041	PM-AP-064	**FSM852D**	103M8582-7011	PM-AP-064	P.16	P.99
		FSM853S	103M8583-7041	PM-AP-064	**FSM853D**	103M8583-7011	PM-AP-064	P.17	P.99
	ϕ106mm (ϕ4.17inch)	**FSM892S**	103M89582-7041	PM-AP-063	**FSM892D**	103M89582-7011	PM-AP-063	P.17	P.100
		FSM893S	103M89583-7041	PM-AP-063	**FSM893D**	103M89583-7011	PM-AP-063	P.17	P.100
Low-backlash gear model	42mm sq. (1.65inch sq.)	**FSF551S-CX3.6**	103F5505-70CXA4	PM-AP-065	**FSF551D-CX3.6**	103F5505-70CXA1	PM-AP-065	P.18	P.101
		FSF551S-CX7.2	103F5505-70CXB4	PM-AP-065	**FSF551D-CX7.2**	103F5505-70CXB1	PM-AP-065	P.18	P.101
		FSF551S-CX10	103F5505-70CXE4	PM-AP-065	**FSF551D-CX10**	103F5505-70CXE1	PM-AP-065	P.18	P.101
		FSF551S-CX20	103F5505-70CXG4	PM-AP-065	**FSF551D-CX20**	103F5505-70CXG1	PM-AP-065	P.18	P.101
		FSF551S-CX30	103F5505-70CXJ4	PM-AP-065	**FSF551D-CX30**	103F5505-70CXJ1	PM-AP-065	P.19	P.101
		FSF551S-CX36	103F5505-70CXK4	PM-AP-065	**FSF551D-CX36**	103F5505-70CXK1	PM-AP-065	P.19	P.101
	60mm sq. (2.36inch sq.)	**FSF781S-CX3.6**	103F7851-70CXA4	PM-AP-064	**FSF781D-CX3.6**	103F7851-70CXA1	PM-AP-064	P.19	P.101
		FSF781S-CX7.2	103F7851-70CXB4	PM-AP-064	**FSF781D-CX7.2**	103F7851-70CXB1	PM-AP-064	P.19	P.101
		FSF781S-CX10	103F7851-70CXE4	PM-AP-064	**FSF781D-CX10**	103F7851-70CXE1	PM-AP-064	P.20	P.101
		FSF781S-CX20	103F7851-70CXG4	PM-AP-064	**FSF781D-CX20**	103F7851-70CXG1	PM-AP-064	P.20	P.101
		FSF781S-CX30	103F7851-70CXJ4	PM-AP-064	**FSF781D-CX30**	103F7851-70CXJ1	PM-AP-064	P.20	P.101
		FSF781S-CX36	103F7851-70CXK4	PM-AP-064	**FSF781D-CX36**	103F7851-70CXK1	PM-AP-064	P.20	P.101
	ϕ86mm (ϕ3.39inch)	**FSF851S-CX3.6**	103F8581-70CXA4	PM-AP-064	**FSF851D-CX3.6**	103F8581-70CXA1	PM-AP-064	P.21	P.101
		FSF851S-CX7.2	103F8581-70CXB4	PM-AP-064	**FSF851D-CX7.2**	103F8581-70CXB1	PM-AP-064	P.21	P.101
		FSF851S-CX10	103F8581-70CXE4	PM-AP-064	**FSF851D-CX10**	103F8581-70CXE1	PM-AP-064	P.21	P.101
		FSF851S-CX20	103F8581-70CXG4	PM-AP-064	**FSF851D-CX20**	103F8581-70CXG1	PM-AP-064	P.21	P.101
		FSF851S-CX30	103F8581-70CXJ4	PM-AP-064	**FSF851D-CX30**	103F8581-70CXJ1	PM-AP-064	P.22	P.101
		FSF851S-CX36	103F8581-70CXK4	PM-AP-064	**FSF851D-CX36**	103F8581-70CXK1	PM-AP-064	P.22	P.101
Harmonic gear model	42mm sq. (1.65inch sq.)	**FSF551S-HX30**	103F5505-70HXJ5	PM-AP-065	**FSF551D-HX30**	103F5505-70HXJ2	PM-AP-065	P.23	P.102
		FSF551S-HX50	103F5505-70HXL5	PM-AP-065	**FSF551D-HX50**	103F5505-70HXL2	PM-AP-065	P.23	P.102
		FSF551S-HX100	103F5505-70HXM5	PM-AP-065	**FSF551D-HX100**	103F5505-70HXM2	PM-AP-065	P.23	P.102
	60mm sq. (2.36inch sq.)	**FSF781S-HX50**	103F7851-70HXL4	PM-AP-064	**FSF781D-HX50**	103F7851-70HXL1	PM-AP-064	P.23	P.103
		FSF781S-HX100	103F7851-70HXM4	PM-AP-064	**FSF781D-HX100**	103F7851-70HXM1	PM-AP-064	P.24	P.103
	ϕ86mm (ϕ3.39inch)	**FSF851S-HX50**	103F8581-70HXL4	PM-AP-064	**FSF851D-HX50**	103F8581-70HXL1	PM-AP-064	P.24	P.103
		FSF851S-HX100	103F8581-70HXM4	PM-AP-064	**FSF851D-HX100**	103F8581-70HXM1	PM-AP-064	P.24	P.103
Electromagnetic brake model	42mm sq. (1.65inch sq.)	**FSF551S-XB**	103F5505-70XB41	PM-AP-065	—	—	—	P.25	P.104
		FSF552S-XB	103F5508-70XB41	PM-AP-065	—	—	—	P.25	P.104
		FSF554S-XB	103F5510-70XB41	PM-AP-065	—	—	—	P.25	P.104
	60mm sq. (2.36inch sq.)	**FSF781S-XB**	103F7851-70XB41	PM-AP-064	—	—	—	P.25	P.104
		FSF782S-XB	103F7852-70XB41	PM-AP-064	—	—	—	P.26	P.104
		FSF783S-XB	103F7853-70XB41	PM-AP-064	—	—	—	P.26	P.104
	ϕ86mm (ϕ3.39inch)	**FSF851S-XB**	103F8581-70XB41	PM-AP-064	—	—	—	P.26	P.104
		FSF852S-XB	103F8582-70XB41	PM-AP-064	—	—	—	P.26	P.104
		FSF853S-XB	103F8583-70XB41	PM-AP-064	—	—	—	P.27	P.104

(Note) : A set of connectors (for power, and input/output signals) for the driver and motor are included in each set configuration.

Connector number	Driver connector set model number	Motor connector model number
PM-AP-065	PM-AP-078	4835758-1
PM-AP-064		4837994-1
PM-AP-063		4838971-1

Connector Set - Housing/Contact List

Driver connector set model number	Connector type	Housing model number (Manufacturer)	Contact model number (Manufacturer)
PM-AP-078	power connector	1-178128-2 (AMP)	1-175218-5 (AMP)
	I/O signal connector	10314-52A0-008 (3M)	10114-3000PE (3M)

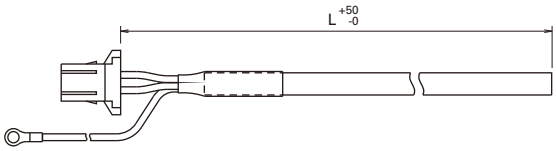
Motor connector model number	Housing model number (Manufacturer)	Contact model number (Manufacturer)	Applicable motor sizes
4835758-1	1-178128-6 (AMP)	1-175216-5 (AMP)	42mm sq. (1.65inch sq.)
4837994-1	1-178128-6 (AMP)	1-175217-5 (AMP)	60mm sq. (2.36inch sq.), ϕ86mm (ϕ3.39inch)
4838971-1	1-178128-6 (AMP)	1-175218-5 (AMP)	ϕ106mm (ϕ4.17inch)

Optional Accessories

Cables have connector at driver end.

Power cable

Cable length (L)	Model number
10m	**PM-C03P1000-05**
5m	**PM-C03P0500-05**
3m	**PM-C03P0300-05**
1m	**PM-C03P0100-05**

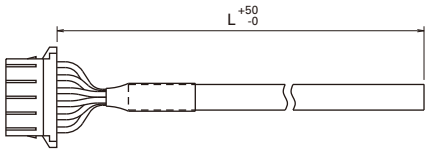


Lead wire	600V vinyl cab tire cable 3-core AWG16 (1.25mm²)
Housing	1-178128-2 (AMP)
Contact	1-175218-5 (AMP)
Round-type crimp contact	1.25M4 (J.S.T. Mfg Co.)

・Cables 10m (32.81 feet) or longer are available upon request.

Motor cable

Cable length (L)	Model number
10m	**PM-C06M1000-11**
5m	**PM-C06M0500-11**
3m	**PM-C06M0300-11**
1m	**PM-C06M0100-11**

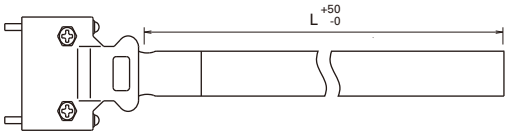


Lead wire	600V vinyl cab tire cable 6-core AWG18 (0.75mm²)
Housing	1-178128-6 (AMP)
Contact	1-175218-5 (AMP)
Round-type crimp contact	1.25M4 (J.S.T. Mfg Co.)

・Cables 10m (32.81 feet) or longer are available upon request.

I/O signal cable

Cable length (L)	Model number
2m	**PM-C14S0200-03**
1m	**PM-C14S0100-03**



Lead wire	7-pair PVC shielded cable AWG28 (0.08mm²)
Shell	10314-52A0-008 (3M)
Plug	10114-3000PE (3M)

Standard model AC input Driver (Model number : FS1W075P00) + Standard motor

Basic step angle : 0.72° Rated current : 0.75A/phase

Motor size		42mm sq. (1.65inch sq.)			60mm sq. (2.36inch sq.)
Motor length		34mm (1.34inch)	40mm (1.57inch)	49mm (1.93inch)	46.5mm (1.83inch)
Single shaft	Set ordering model no.	**FSF551S**	**FSF552S**	**FSF554S**	**FSF781S**
	Corresponding motor model number	103F5505-7041	103F5508-7041	103F5510-7041	103F7851-7041
Double shaft	Set ordering model no.	**FSF551D**	**FSF552D**	**FSF554D**	**FSF781D**
	Corresponding motor model number	103F5505-7011	103F5508-7011	103F5510-7011	103F7851-7011
Holding torque	N · m (OZ · in)	0.13 (18.41)	0.18 (25.49)	0.26 (36.82)	0.6 (85.0)
Rotor inertia	(OZ · in²)	0.03 (0.16)	0.053 (0.29)	0.065 (0.36)	0.275 (1.50)
Motor mass (Note1)	kg (lbs)	0.23 (0.50)	0.28 (0.62)	0.37 (0.81)	0.6 (1.32)
Allowable thrust load	N (lbs)	10 (2.25)	10 (2.25)	10 (2.25)	20 (4.5)
Allowable radial load (Note2)	N (lbs)	35 (8.75)	35 (8.75)	35 (8.75)	80 (18)

(Note1) Driver mass ▶ P.29
(Note2) When load is applied at 1/3 length from output shaft edge.

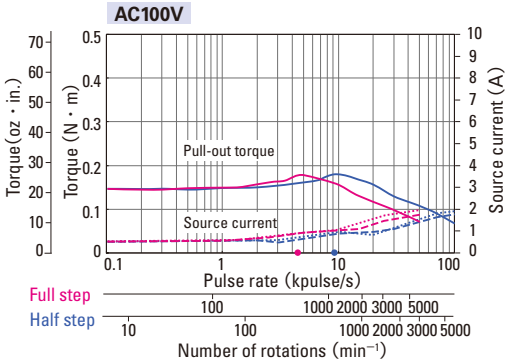
Characteristics

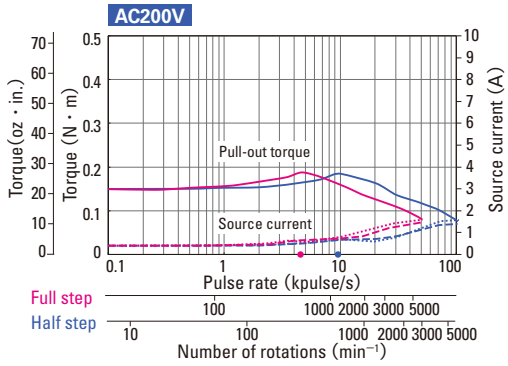
Operating current : 0.75A/phase
Use the rubber coupling

Pull-out torque Full step ——— Half step ———
Source current (no load) Full step - - - Half step - - -

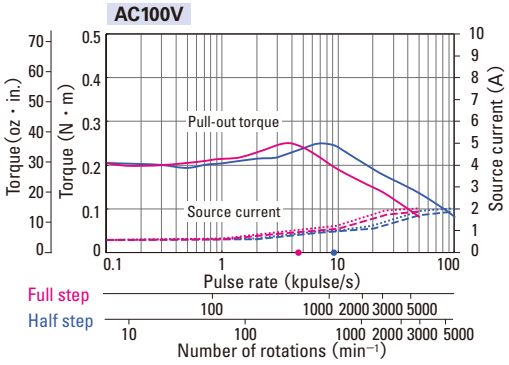
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

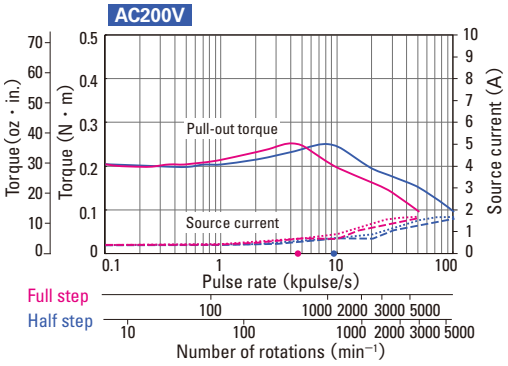
FSF551S FSF551D



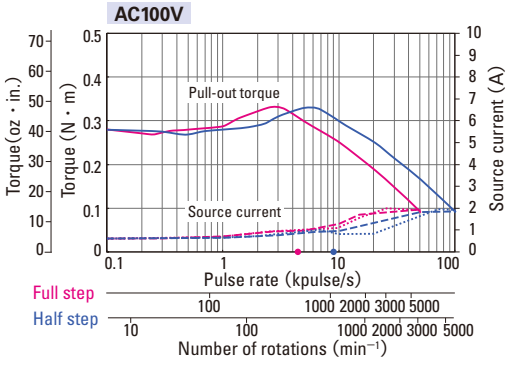


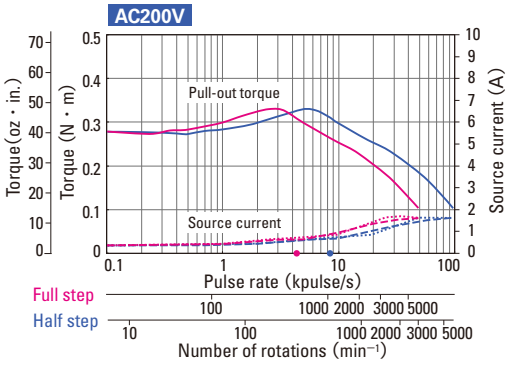
FSF552S FSF552D



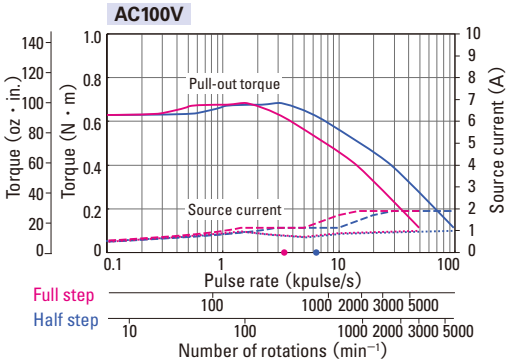


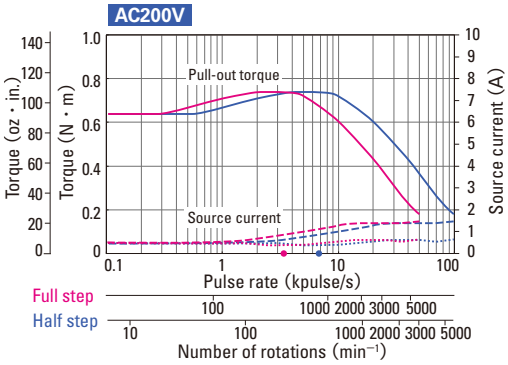
FSF554S FSF554D





FSF781S FSF781D





System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.97 to 100 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size		60mm sq. (2.36inch sq.)		⌀86mm (⌀3.39inch)	
Motor length		55mm (2.17inch)	87.5mm (3.45inch)	62.15mm (2.47inch)	92.2mm (3.63inch)
Single shaft	Set ordering model no.	**FSF782S**	**FSF783S**	**FSF851S**	**FSF852S**
	Corresponding motor model number	103F7852-7041	103F7853-7041	103F8581-7041	103F8582-7041
Double shaft	Set ordering model no.	**FSF782D**	**FSF783D**	**FSF851D**	**FSF852D**
	Corresponding motor model number	103F7852-7011	103F7853-7011	103F8581-7011	103F8582-7011
Holding torque	N · m (OZ · in)	0.93 (131.7)	1.79 (253.5)	2.06 (291.7)	4.02 (569.3)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	0.4 (2.19)	0.84 (4.60)	1.45 (7.93)	2.9 (15.86)
Motor mass (Note1)	kg (lbs)	0.78 (1.72)	1.36 (3.0)	1.5 (3.3)	2.5 (5.5)
Allowable thrust load	N (lbs)	20 (4.5)	20 (4.5)	60 (13.5)	60 (13.5)
Allowable radial load (Note2)	N (lbs)	80 (18)	80 (18)	220 (49.5)	220 (49.5)

(Note1) Driver mass ▶ P.29
(Note2) When load is applied at 1/3 length from output shaft edge.

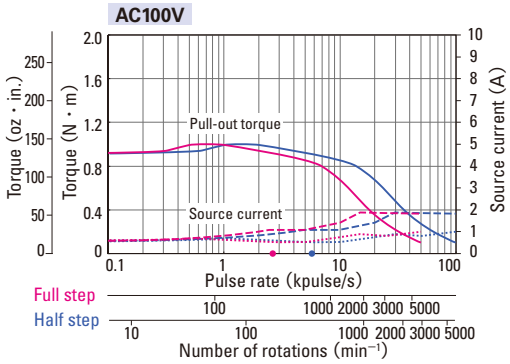
Characteristics

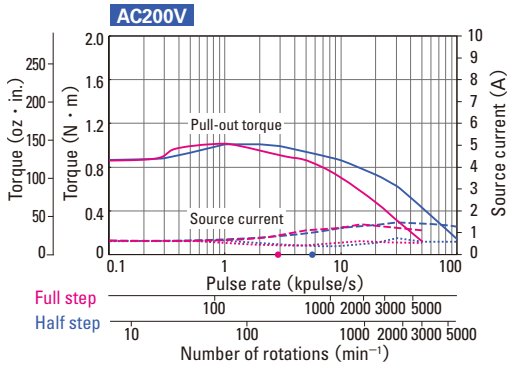
Operating current : 0.75A/phase
Use the rubber coupling

Pull-out torque Full step ——— Half step ———
Source current (no load) Full step - - - Half step - - -

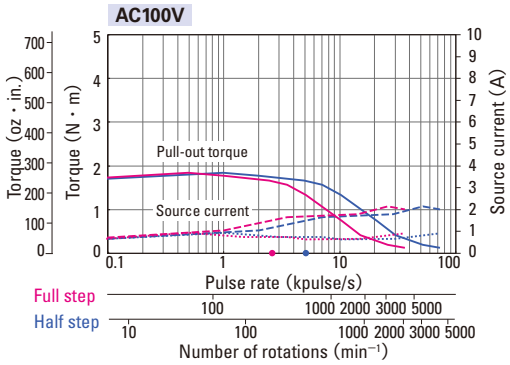
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

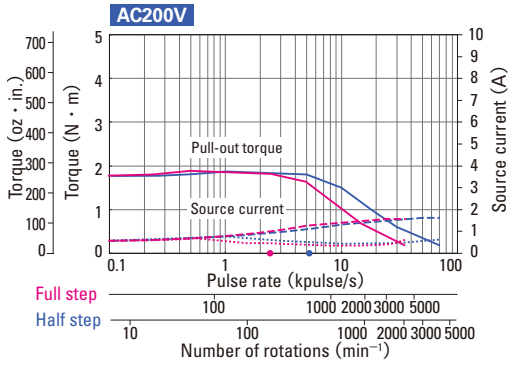
FSF782S FSF782D



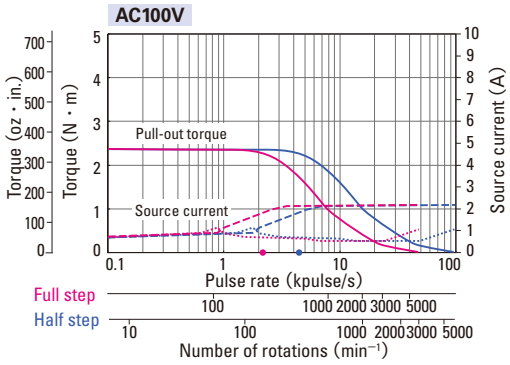


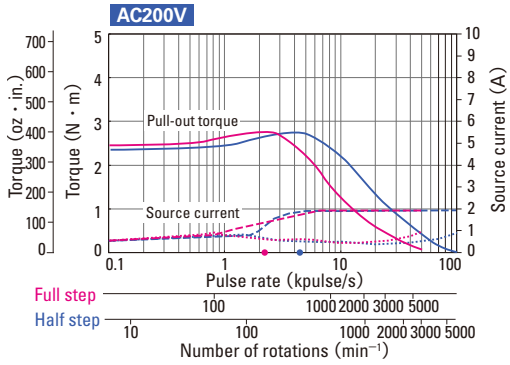
FSF783S FSF783D



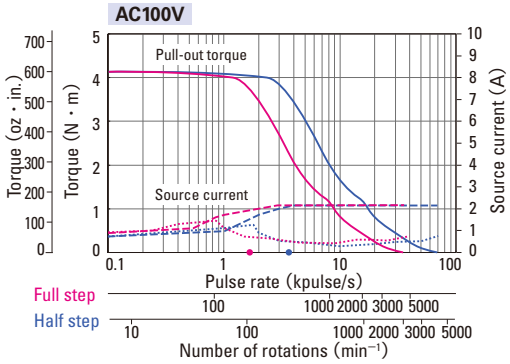


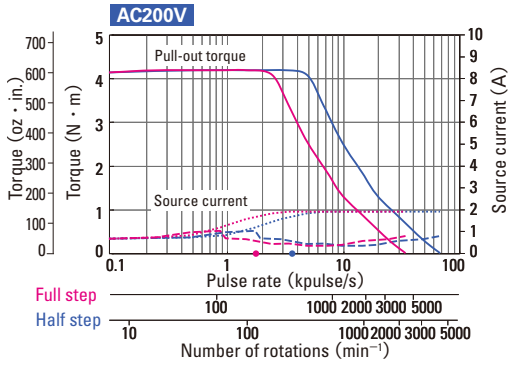
FSF851S FSF851D





FSF852S FSF852D





System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.97 to 100 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Standard model AC input Driver (Model number : FS1W075P00) + Standard motor

Basic step angle : 0.72° Rated current : 0.75A/phase

Motor size		ϕ86mm (ϕ3.39inch)	ϕ106mm (ϕ4.17inch)	
Motor length		125.85mm (4.95inch)	163.3mm (6.43inch)	221.3mm (8.71inch)
Single shaft	Set ordering model no.	FSF853S	FSF892S	FSF893S
	Corresponding motor model number	103F8583-7041	103F89582-7041	103F89583-7041
Double shaft	Set ordering model no.	FSF853D	FSF892D	FSF893D
	Corresponding motor model number	103F8583-7011	103F89582-7011	103F89583-7011
Holding torque	N · m (OZ · in)	6.17 (873.7)	10.8 (1529.4)	16 (2265.7)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	4.4 (24.06)	14.6 (79.83)	22 (120.28)
Motor mass (Note1)	kg (lbs)	3.5 (7.7)	7.5 (16.5)	10.5 (23.1)
Allowable thrust load	N (lbs)	60 (13.5)	100 (22.5)	100 (22.5)
Allowable radial load (Note2)	N (lbs)	220 (49.5)	360 (81)	360 (81)

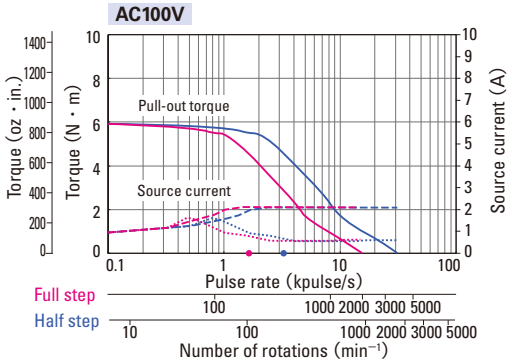
(Note1) Driver mass ▶ P.29
(Note2) When load is applied at 1/3 length from output shaft edge.

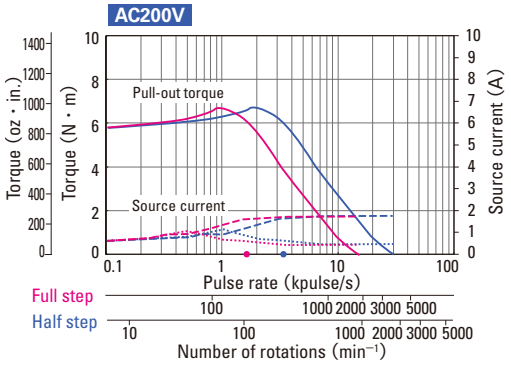
Characteristics

Operating current : 0.75A/phase
Use the rubber coupling

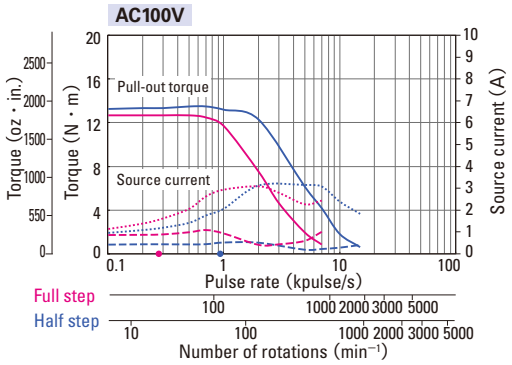
Pull-out torque Full step Half step
Source current (no load) Full step Half step
fs : Maximum self-start frequency when not loaded Full step Half step
Source current (load applied) Full step Half step

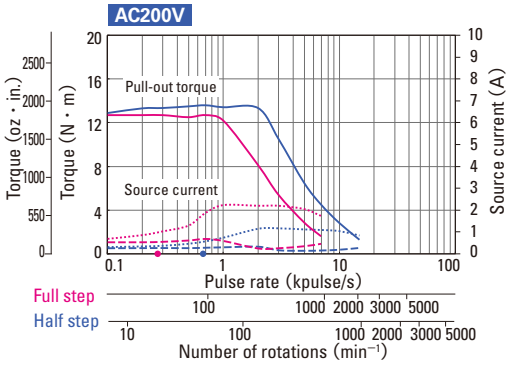
FSF853S FSF853D



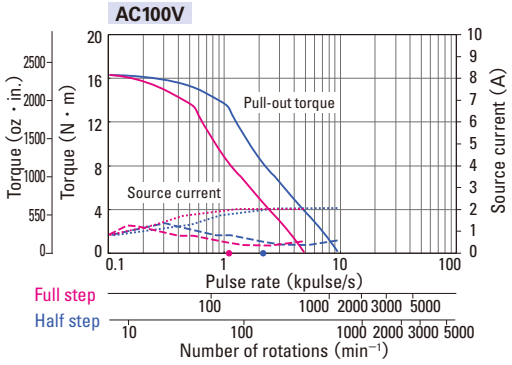


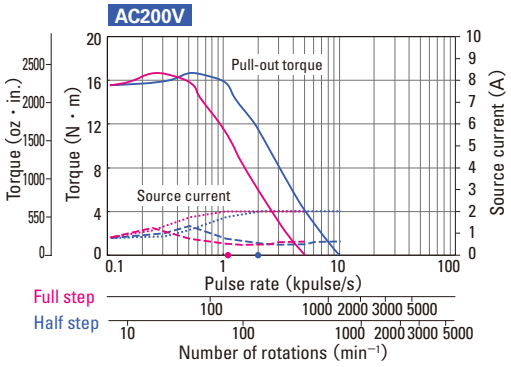
FSF892S FSF892D





FSF893S FSF893D





System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.97 to 100 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

CE / UL model AC input Driver (Model number : FS1W075P00) + CE/UL Compliant Motor

Basic step angle : 0.72° Rated current : 0.75A/phase

Motor size		42mm sq. (1.65inch sq.)			60mm sq.(2.36inch sq.)
Motor length		34mm (1.34inch)	40mm (1.57inch)	49mm (1.93inch)	46.5mm (1.83inch)
Single shaft	Set ordering model no.	FSM551S	FSM552S	FSM554S	FSM781S
	Corresponding motor model number	103M5505-7041	103M5508-7041	103M5510-7041	103M7851-7041
Double shaft	Set ordering model no.	FSM551D	FSM552D	FSM554D	FSM781D
	Corresponding motor model number	103M5505-7011	103M5508-7011	103M5510-7011	103M7851-7011
Holding torque	N · m (OZ · in)	0.13 (18.41)	0.18 (25.49)	0.26 (36.82)	0.6 (85.0)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	0.03 (0.16)	0.053 (0.29)	0.065 (0.36)	0.275 (1.50)
Motor mass (Note1)	kg (lbs)	0.23 (0.51)	0.28 (0.62)	0.37 (0.81)	0.6 (1.32)
Allowable thrust load	N (lbs)	10 (2.25)	10 (2.25)	10 (2.25)	20 (4.5)
Allowable radial load (Note2)	N (lbs)	35 (8.75)	35 (8.75)	35 (8.75)	80 (18)

(Note1) Driver mass ▶ P.29

(Note2) When load is applied at 1/3 length from output shaft edge.

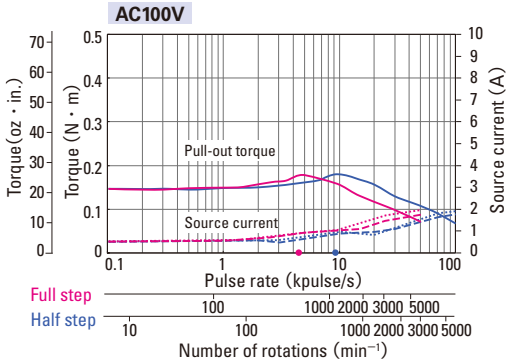
Characteristics

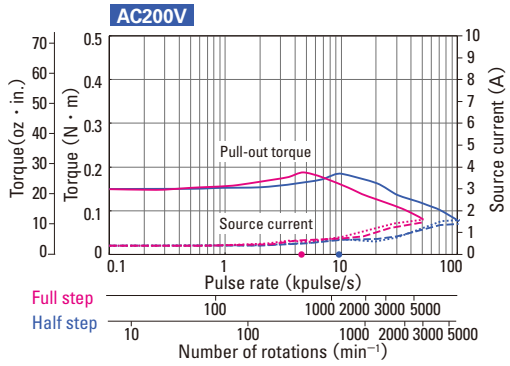
Operating current : 0.75A/phase
Use the rubber coupling

Pull-out torque Full step ——— Half step ———
Source current (no load) Full step - - - Half step - - -

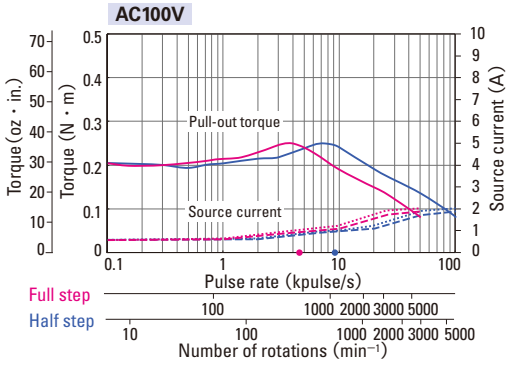
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

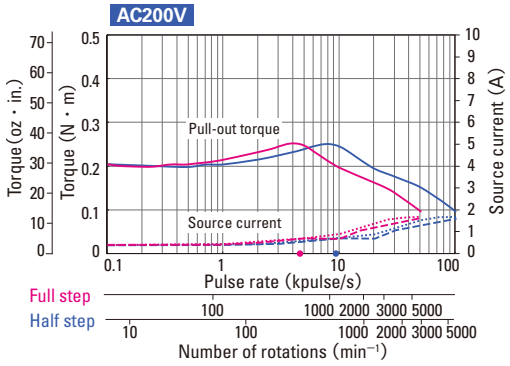
FSM551S FSM551D



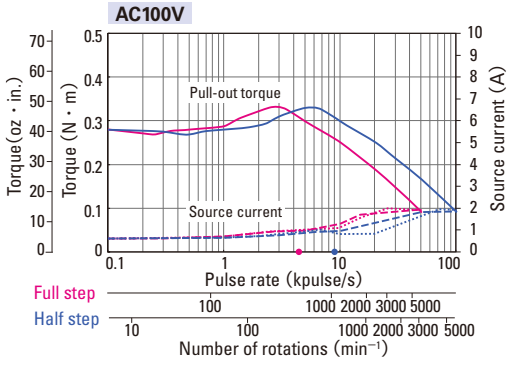


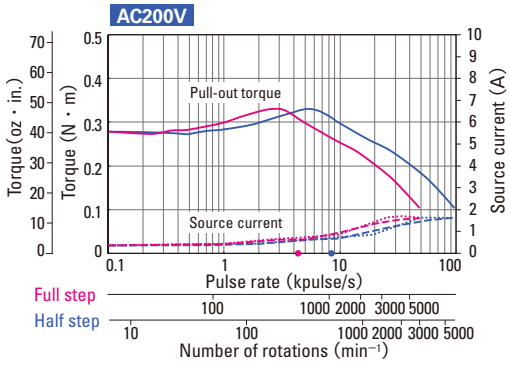
FSM552S FSM552D



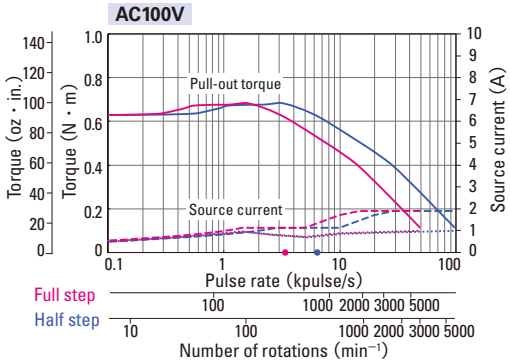


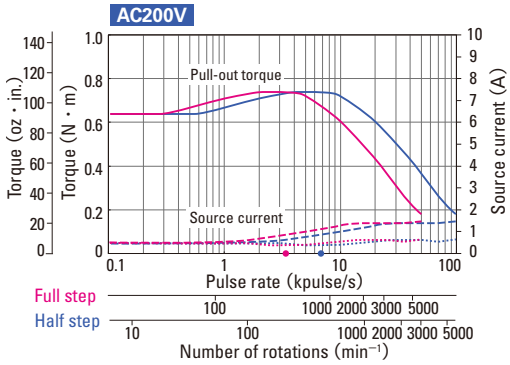
FSM554S FSM554D





FSM781S FSM781D





System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.97 to 100 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

CE / UL model AC input Driver (Model number : FS1W075P00) + CE/UL Compliant Motor

Basic step angle : 0.72° Rated current : 0.75A/phase

Motor size		60mm sq. (2.36inch sq.)		ϕ86mm (ϕ3.39inch)	
Motor length		55mm (2.17inch)	87.5mm (3.44inch)	62.15mm (2.47inch)	92.2mm (3.63inch)
Single shaft	Set ordering model no.	FSM782S	FSM783S	FSM851S	FSM852S
	Corresponding motor model number	103M7852-7041	103M7853-7041	103M8581-7041	103M8582-7041
Double shaft	Set ordering model no.	FSM782D	FSM783D	FSM851D	FSM852D
	Corresponding motor model number	103M7852-7011	103M7853-7011	103M8581-7011	103M8582-7011
Holding torque	N · m (OZ · in)	0.93 (131.7)	1.79 (253.5)	2.06 (291.7)	4.02 (569.3)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	0.4 (2.19)	0.84 (4.59)	1.45 (7.93)	2.9 (15.86)
Motor mass (Note1)	kg (lbs)	0.78 (1.72)	1.36 (3.0)	1.5 (3.3)	2.5 (5.5)
Allowable thrust load	N (lbs)	20 (4.5)	20 (4.5)	60 (13.5)	60 (13.5)
Allowable radial load (Note2)	N (lbs)	80 (18)	80 (18)	220 (49.5)	220 (49.5)

(Note1) Driver mass ▶ P.29
(Note2) When load is applied at 1/3 length from output shaft edge.

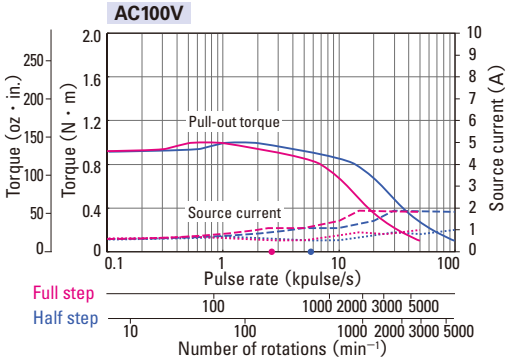
Characteristics

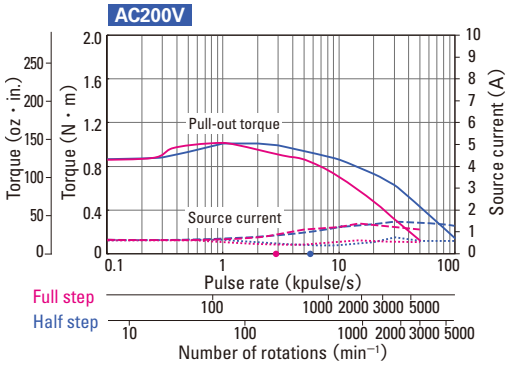
Operating current : 0.75A/phase
Use the rubber coupling

Pull-out torque Full step ——— Half step ———
Source current (no load) Full step - - - Half step - - -

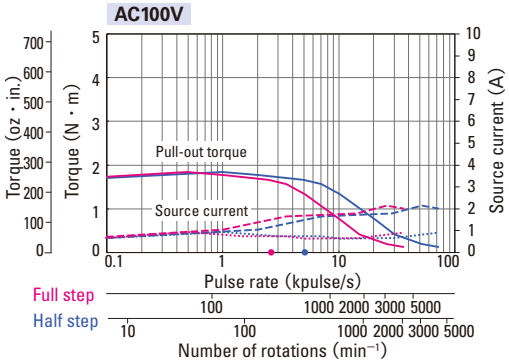
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

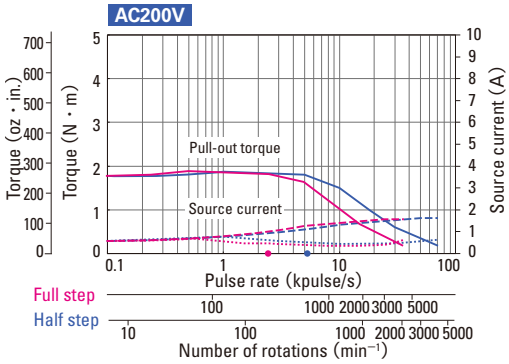
FSM782S FSM782D



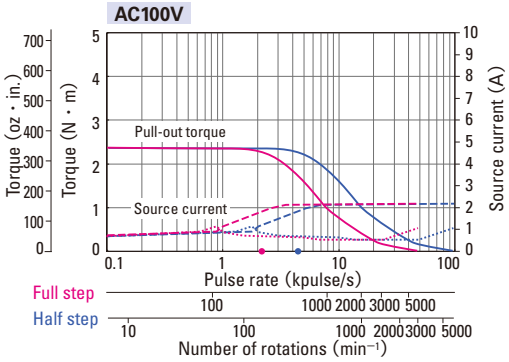


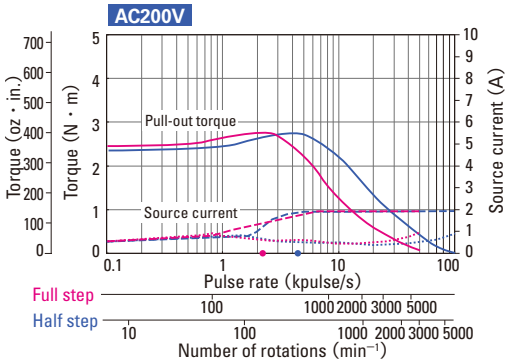
FSM783S FSM783D



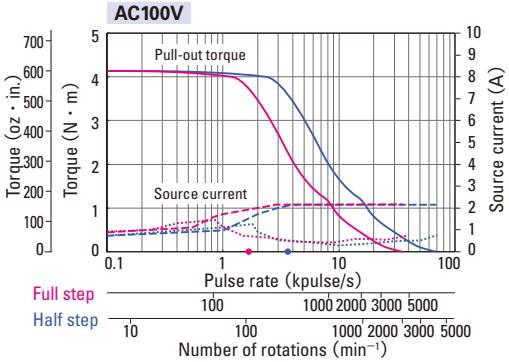


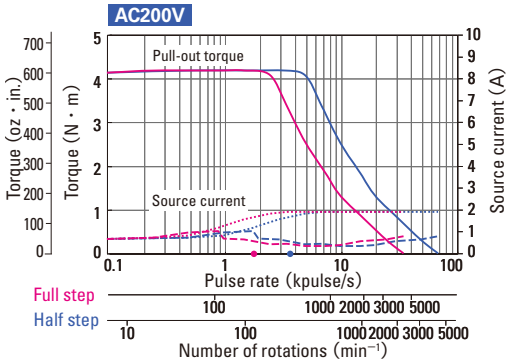
FSM851S FSM851D





FSM852S FSM852D





System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.97 to 100 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size		ϕ86mm (ϕ3.39inch)	ϕ106mm (ϕ4.17inch)	
Motor length		125.85mm (4.95inch)	163.3mm (6.43inch)	221.3mm (8.71inch)
Single shaft	Set ordering model no.	FSM853S	FSM892S	FSM893S
	Corresponding motor model number	103M8583-7041	103M89582-7041	103M89583-7041
Double shaft	Set ordering model no.	FSM853D	FSM892D	FSM893D
	Corresponding motor model number	103M8583-7011	103M89582-7011	103M89583-7011
Holding torque	N · m (OZ · in)	6.17 (873.7)	10.8 (1529.4)	16 (2265.7)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	4.4 (24.06)	14.6 (79.83)	22 (120.18)
Motor mass (Note1)	kg (lbs)	3.5 (7.7)	7.5 (16.5)	10.5 (23.1)
Allowable thrust load	N (lbs)	60 (13.5)	100 (22.5)	100 (22.5)
Allowable radial load (Note2)	N (lbs)	220 (49.5)	360 (81)	360 (81)

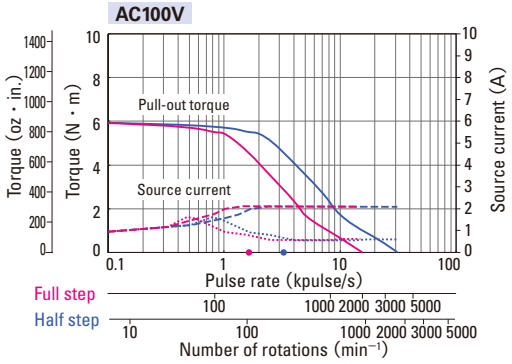
(Note1) Driver mass ▶ P.29
(Note2) When load is applied at 1/3 length from output shaft edge.

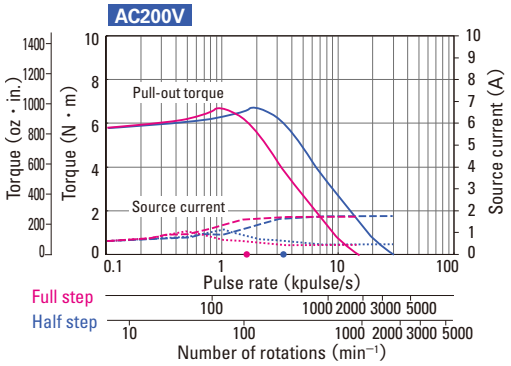
Characteristics

Operating current : 0.75A/phase
Use the rubber coupling

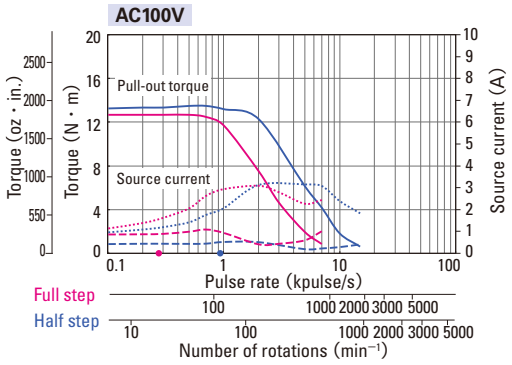
Pull-out torque Full step ——— Half step ———
Source current (no load) Full step - - - Half step - - -
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

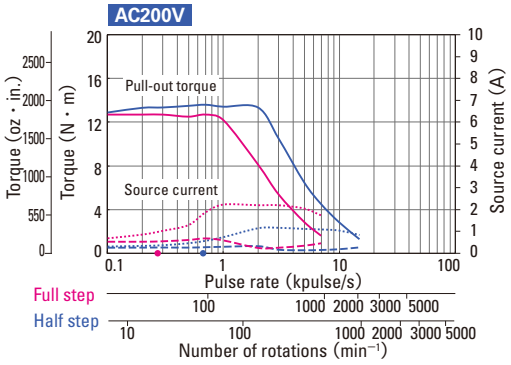
FSM853S FSM853D



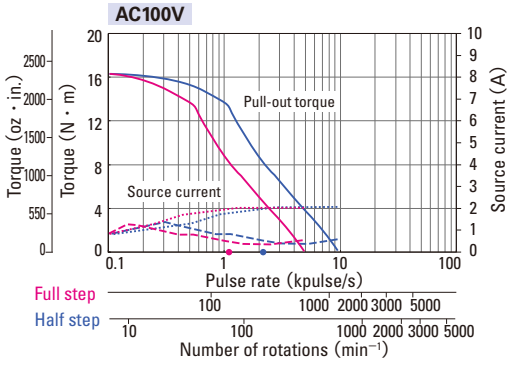


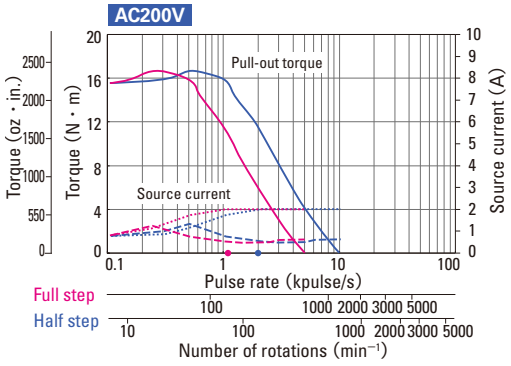
FSM892S FSM892D





FSM893S FSM893D





System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.97 to 100 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Low-backlash gear model AC input Driver (Model number : FS1W075P00) + Motor with low-backlash gear

Rated current : 0.75A/phase

Motor size		42mm sq. (1.65inch sq.)			
Motor + gear length		64.5mm (2.54inch)	64.5mm (2.54inch)	64.5mm (2.54inch)	64.5mm (2.54inch)
Single shaft	Set ordering model no.	FSF551S-CX3.6	FSF551S-CX7.2	FSF551S-CX10	FSF551S-CX20
	Corresponding motor model number	103F5505-70CXA4	103F5505-70CXB4	103F5505-70CXE4	103F5505-70CXG4
Double shaft	Set ordering model no.	FSF551D-CX3.6	FSF551D-CX7.2	FSF551D-CX10	FSF551D-CX20
	Corresponding motor model number	103F5505-70CXA1	103F5505-70CXB1	103F5505-70CXE1	103F5505-70CXG1
Allowable torque	N · m (OZ · in)	0.343 (48.6)	0.686 (97.1)	0.98 (138.8)	1.47 (208.2)
Rotor inertia	X 10^{-4}kg · m² (OZ · in²)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)
Basic step angle	DEG	0.2	0.1	0.072	0.036
Gear ratio	-	1 : 3.6	1 : 7.2	1 : 10	1 : 20
Backlash	DEG	0.6	0.4	0.35	0.25
Allowable speed	min^{-1}	500	250	180	90
Motor mass (Note1)	kg (lbs)	0.36 (0.79)	0.36 (0.79)	0.36 (0.79)	0.36 (0.79)
Allowable thrust load	N (lbs)	15 (3.38)	15 (3.38)	15 (3.38)	15 (3.38)
Allowable radial load (Note2)	N (lbs)	20 (4.5)	20 (4.5)	20 (4.5)	20 (4.5)

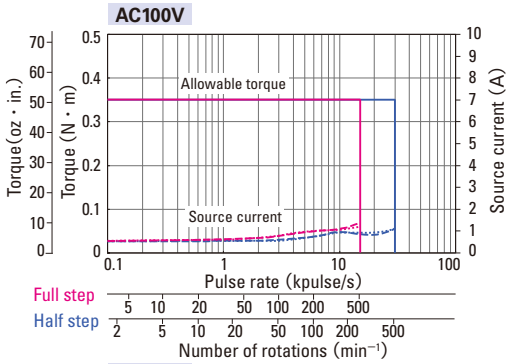
Directions of motor rotation and gear output shaft are the same for models with reduction ratio 1 : 3.6, 1 : 7.2 and 1 : 10 opposite for reduction ratio 1 : 20, 1 : 30, and 1 : 36.
(Note1) Driver mass ▶ P.29
(Note2) When load is applied at 1/3 length from output shaft edge.

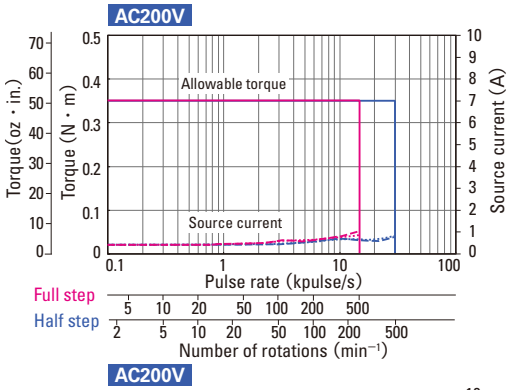
Characteristics

Operating current : 0.75A/phase
Use the rubber coupling

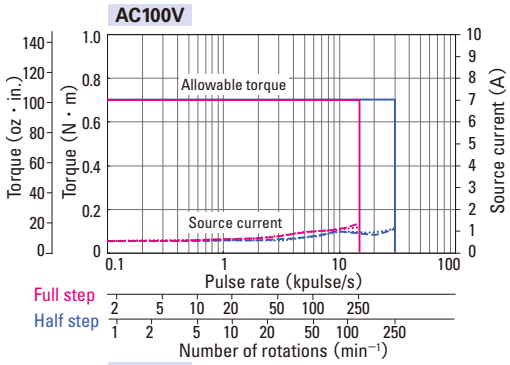
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

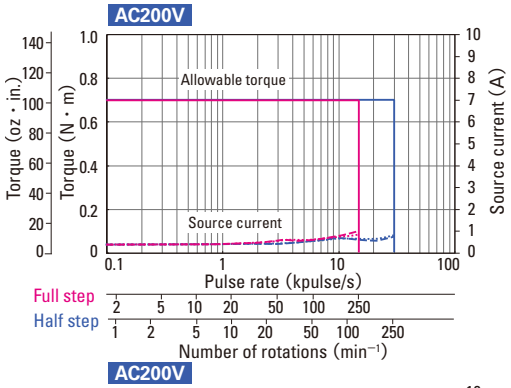
FSF551S-CX3.6 FSF551D-CX3.6



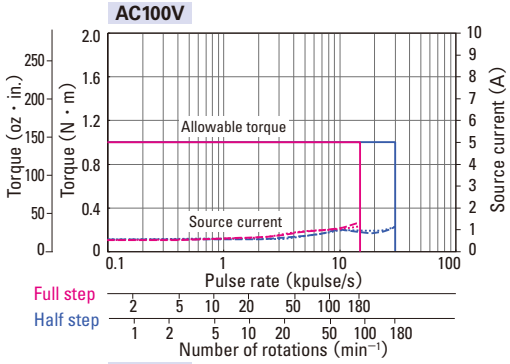


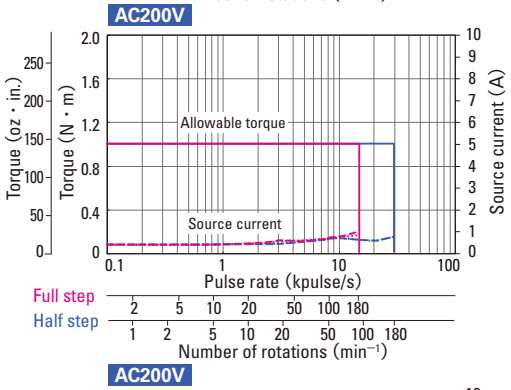
FSF551S-CX7.2 FSF551D-CX7.2



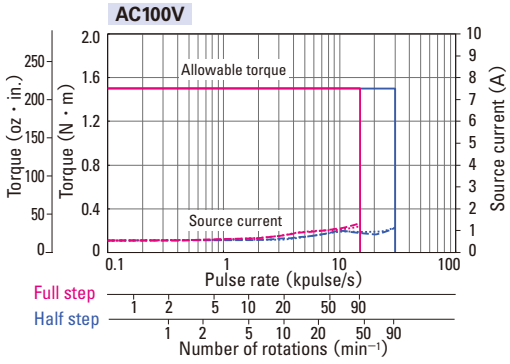


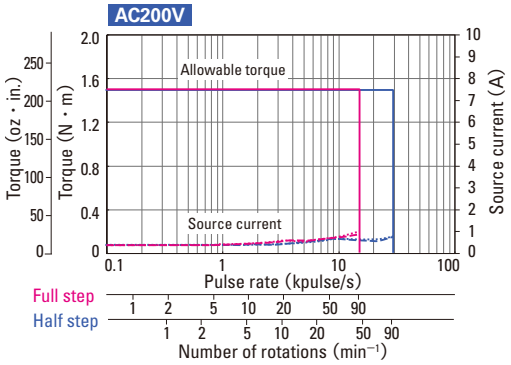
FSF551S-CX10 FSF551D-CX10





FSF551S-CX20 FSF551D-CX20





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size			42mm sq. (1.65inch sq.)		60mm sq. (2.36inch sq.)	
Motor + gear length			64.5mm (2.54inch)	64.5mm (2.54inch)	92mm (3.62inch)	92mm (3.62inch)
Single shaft	Set ordering model no.		FSF551S-CX30	FSF551S-CX36	FSF781S-CX3.6	FSF781S-CX7.2
	Corresponding motor model number		103F5505-70CXJ4	103F5505-70CXK4	103F7851-70CXA4	103F7851-70CXB4
Double shaft	Set ordering model no.		FSF551D-CX30	FSF551D-CX36	FSF781D-CX3.6	FSF781D-CX7.2
	Corresponding motor model number		103F5505-70CXJ1	103F5505-70CXK1	103F7851-70CXA1	103F7851-70CXB1
Allowable torque		N · m (OZ · in)	1.47 (208.2)	1.47 (208.2)	1.25 (177.0)	2.5 (354.0)
Rotor inertia		X 10^{-4}kg · m² (OZ · in²)	0.03 (0.16)	0.03 (0.16)	0.275 (1.5)	0.275 (1.5)
Basic step angle		DEG	0.024	0.02	0.2	0.1
Gear ratio		-	1 : 30	1 : 36	1 : 3.6	1 : 7.2
Backlash		DEG	0.25	0.25	0.55	0.25
Allowable speed		min^{-1}	60	50	500	250
Motor mass (Note1)		kg (lbs)	0.36 (0.79)	0.36 (0.79)	0.97 (2.13)	0.97 (2.13)
Allowable thrust load		N (lbs)	15 (3.38)	15 (3.38)	30 (6.75)	30 (6.75)
Allowable radial load (Note2)		N (lbs)	20 (4.5)	20 (4.5)	100 (22.5)	100 (22.5)

The directions of motor rotation and gear output axle rotation for 42 mm models are the same for 1:3.6, 1:7.2 and 1:10 reduction ratios, and opposite for 1:20, 1:30 and 1:36 reduction ratios.
For 60 mm models, rotation directions are the same for 1:3.6 and 1:7.2 reduction ratios, and opposite for 1:10, 1:20, 1:30 and 1:36 reduction ratios.

(Note1) Driver mass ▶ P.29

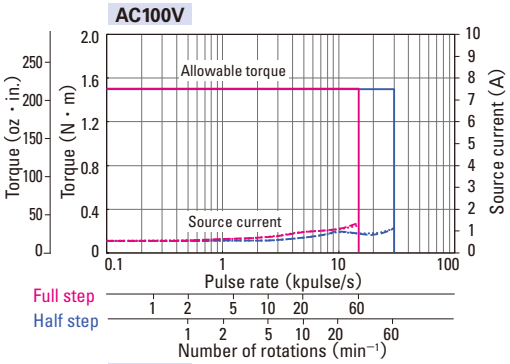
(Note2) When load is applied at 1/3 length from output shaft edge.

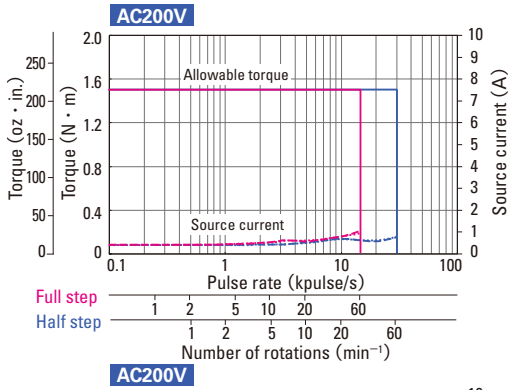
Characteristics

Operating current : 0.75A/phase
Use the rubber coupling

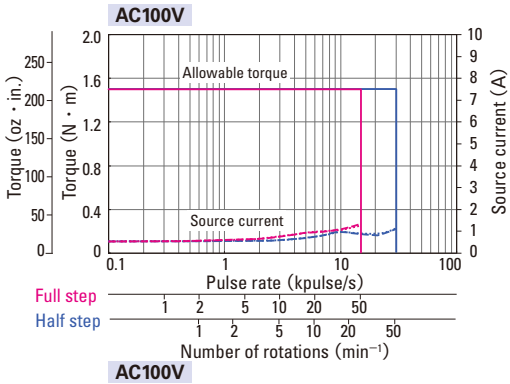
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

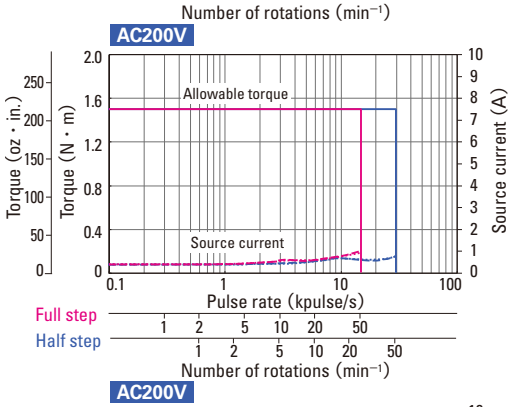
FSF551S-CX30 FSF551D-CX30



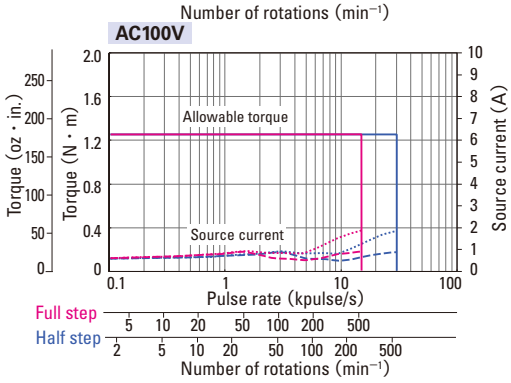


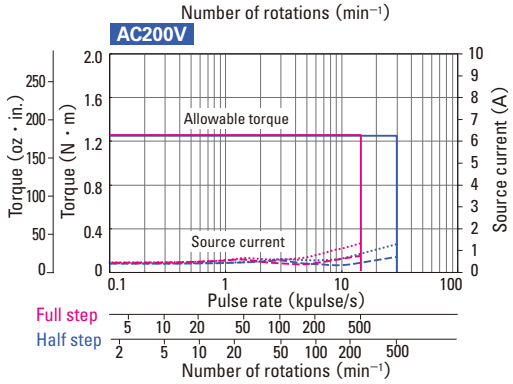
FSF551S-CX36 FSF551D-CX36



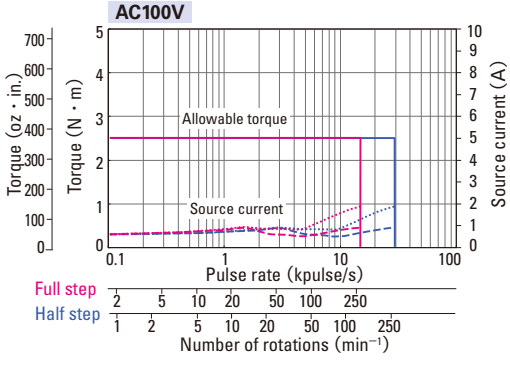


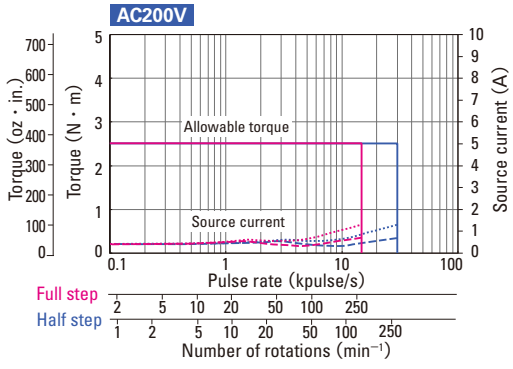
FSF781S-CX3.6 FSF781D-CX3.6





FSF781S-CX7.2 FSF781D-CX7.2





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Low-backlash gear model AC input Driver (Model number : FS1W075P00) + Motor with low-backlash gear

Rated current : 0.75A/phase

Motor size		60mm sq. (2.36inch sq.)			
Motor + gear length		92mm (3.62inch)	92mm (3.62inch)	92mm (3.62inch)	92mm (3.62inch)
Single shaft	Set ordering model no.	FSF781S-CX10	FSF781S-CX20	FSF781S-CX30	FSF781S-CX36
	Corresponding motor model number	103F7851-70CXE4	103F7851-70CXG4	103F7851-70CXJ4	103F7851-70CXK4
Double shaft	Set ordering model no.	FSF781D-CX10	FSF781D-CX20	FSF781D-CX30	FSF781D-CX36
	Corresponding motor model number	103F7851-70CXE1	103F7851-70CXG1	103F7851-70CXJ1	103F7851-70CXK1
Allowable torque	N · m (OZ · in)	3 (424.8)	3.5 (495.6)	4 (566.4)	4 (566.4)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	0.275 (1.5)	0.275 (1.5)	0.275 (1.5)	0.275 (1.5)
Basic step angle	DEG	0.072	0.036	0.024	0.02
Gear ratio	-	1 : 10	1 : 20	1 : 30	1 : 36
Backlash	DEG	0.25	0.17	0.17	0.17
Allowable speed	min^{-1}	180	90	60	50
Motor mass (Note1)	kg (lbs)	0.97 (2.13)	0.97 (2.13)	0.97 (2.13)	0.97 (2.13)
Allowable thrust load	N (lbs)	30 (6.75)	30 (6.75)	30 (6.75)	30 (6.75)
Allowable radial load (Note2)	N (lbs)	100 (22.5)	100 (22.5)	100 (22.5)	100 (22.5)

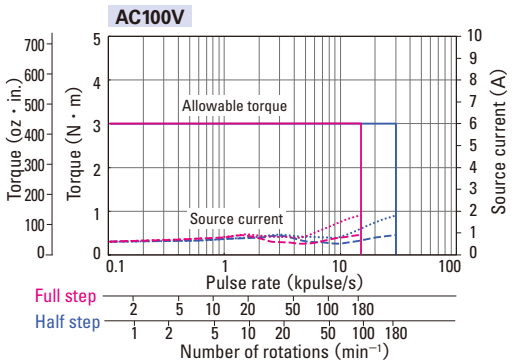
The directions of motor rotation and gear output axle rotation are the same for models with reduction ratio 1:3.6 and 1:7.2 reduction ratios, and opposite for 1:10, 1:20, 1:30 and 1:36 reduction ratios.
(Note1) Driver mass ▶ P.29
(Note2) When load is applied at 1/3 length from output shaft edge.

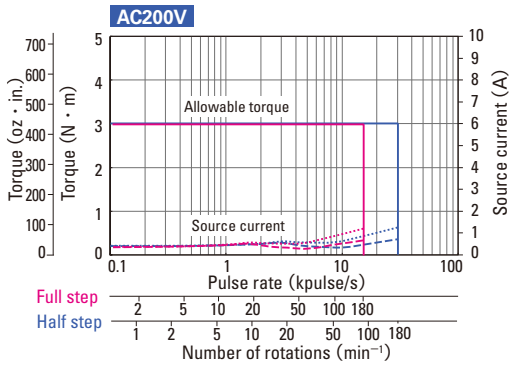
Characteristics

Operating current : 0.75A/phase
Use the rubber coupling

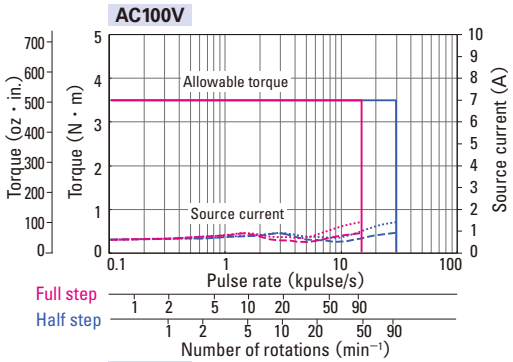
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

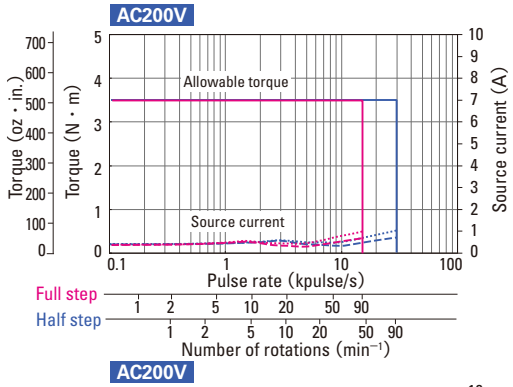
FSF781S-CX10 FSF781D-CX10



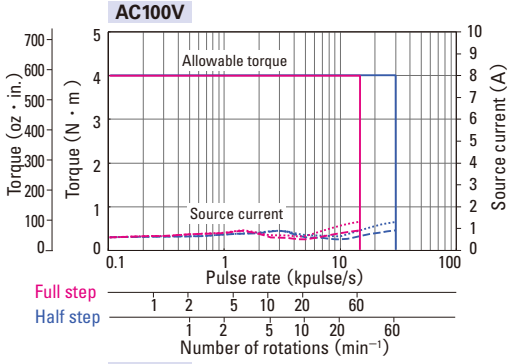


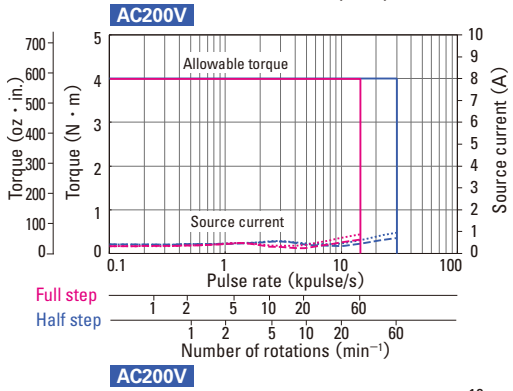
FSF781S-CX20 FSF781D-CX20



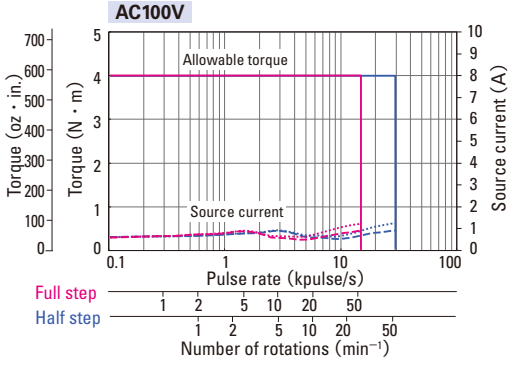


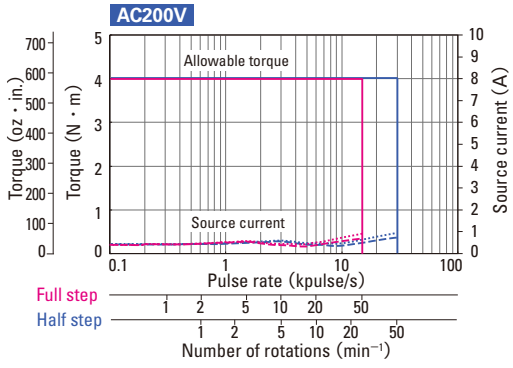
FSF781S-CX30 FSF781D-CX30





FSF781S-CX36 FSF781D-CX36





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size			ϕ86mm (ϕ3.39inch)			
Motor + gear length			127.3mm (5.01inch)	127.3mm (5.01inch)	127.3mm (5.01inch)	127.3mm (5.01inch)
Single shaft	Set ordering model no.		FSF851S-CX3.6	FSF851S-CX7.2	FSF851S-CX10	FSF851S-CX20
	Corresponding motor model number		103F8581-70CXA4	103F8581-70CXB4	103F8581-70CXE4	103F8581-70CXG4
Double shaft	Set ordering model no.		FSF851D-CX3.6	FSF851D-CX7.2	FSF851D-CX10	FSF851D-CX20
	Corresponding motor model number		103F8581-70CXA1	103F8581-70CXB1	103F8581-70CXE1	103F8581-70CXG1
Allowable torque		N · m (OZ · in)	4.5 (637.2)	9 (1274.5)	9 (1274.5)	12 (1699.3)
Rotor inertia		X 10^{-4}kg · m² (OZ · in²)	1.45 (7.93)	1.45 (7.93)	1.45 (7.93)	1.45 (7.93)
Basic step angle		DEG	0.2	0.1	0.072	0.036
Gear ratio		-	1 : 3.6	1 : 7.2	1 : 10	1 : 20
Backlash		DEG	0.35	0.22	0.22	0.15
Allowable speed		min^{-1}	500	250	180	90
Motor mass (Note1)		kg (lbs)	2.7 (5.94)	2.7 (5.94)	2.7 (5.94)	2.7 (5.94)
Allowable thrust load		N (lbs)	60 (13.5)	60 (13.5)	60 (13.5)	60 (13.5)
Allowable radial load (Note2)		N (lbs)	300 (67.5)	300 (67.5)	300 (67.5)	300 (67.5)

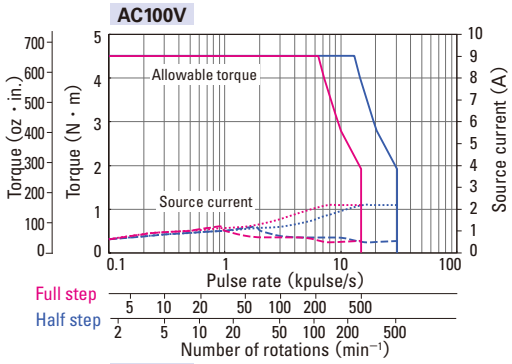
The directions of motor rotation and gear output axle rotation are the same for models with reduction ratio 1:3.6 and 1:7.2 reduction ratios, and opposite for 1:10, 1:20, 1:30 and 1:36 reduction ratios.
(Note1) Driver mass ▶ P.29
(Note2) When load is applied at 1/3 length from output shaft edge.

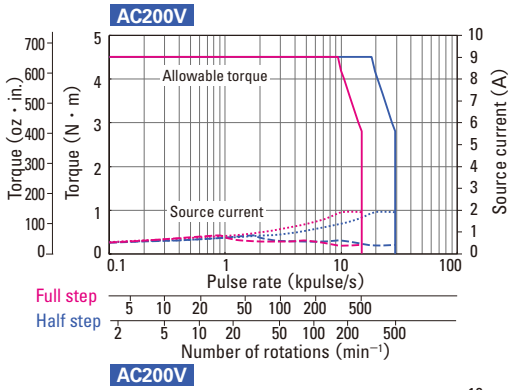
Characteristics

Operating current : 0.75A/phase
Use the rubber coupling

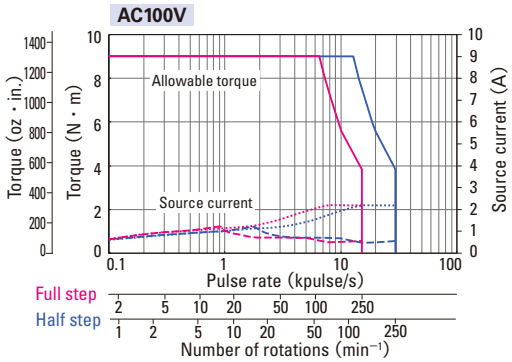
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

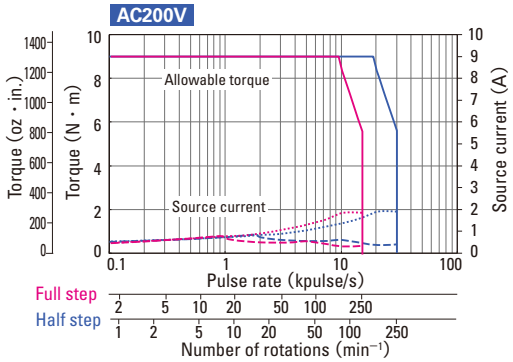
FSF851S-CX3.6 FSF851D-CX3.6



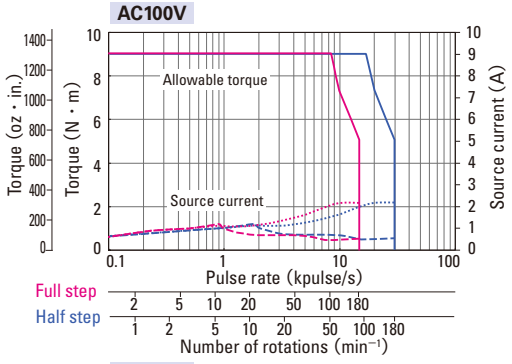


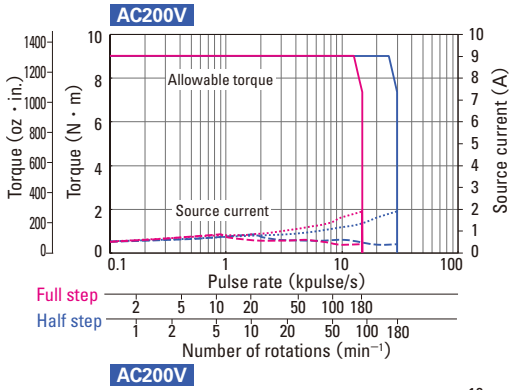
FSF851S-CX7.2 FSF851D-CX7.2



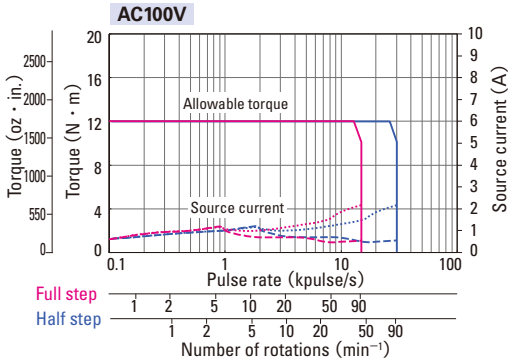


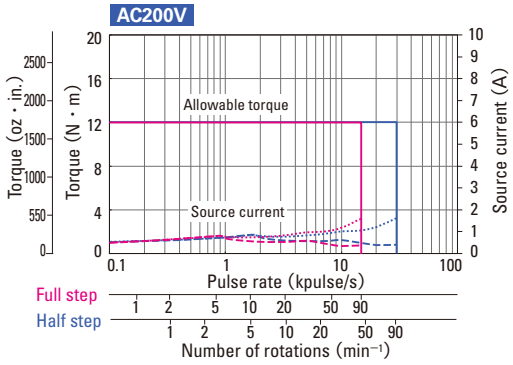
FSF851S-CX10 FSF851D-CX10





FSF851S-CX20 FSF851D-CX20





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Low-backlash gear model AC input Driver (Model number : FS1W075P00) + Motor with low-backlash gear

Rated current : 0.75A/phase

Motor size			⌀86mm (⌀3.39inch)	
Motor + gear length			127.3mm (5.01inch)	127.3mm (5.01inch)
Single shaft	Set ordering model no.		FSF851S-CX30	FSF851S-CX36
	Corresponding motor model number		103F8581-70CXJ4	103F8581-70CXK4
Double shaft	Set ordering model no.		FSF851D-CX30	FSF851D-CX36
	Corresponding motor model number		103F8581-70CXJ1	103F8581-70CXK1
Allowable torque		N · m (OZ · in)	12 (1699.3)	12 (1699.3)
Rotor inertia		X 10^{-4}kg · m² (OZ · in²)	1.45 (7.93)	1.45 (7.93)
Basic step angle		DEG	0.024	0.02
Gear ratio		-	1 : 30	1 : 36
Backlash		DEG	0.15	0.15
Allowable speed		min^{-1}	60	50
Motor mass (Note1)		kg (lbs)	2.7 (5.94)	2.7 (5.94)
Allowable thrust load		N (lbs)	60 (13.5)	60 (13.5)
Allowable radial load (Note2)		N (lbs)	300 (67.5)	300 (67.5)

The directions of motor rotation and gear output axle rotation are the same for models with reduction ratio 1:3.6 and 1:7.2 reduction ratios, and opposite for 1:10, 1:20, 1:30 and 1:36 reduction ratios.
(Note1) Driver mass ▶ P.29
(Note2) When load is applied at 1/3 length from output shaft edge.

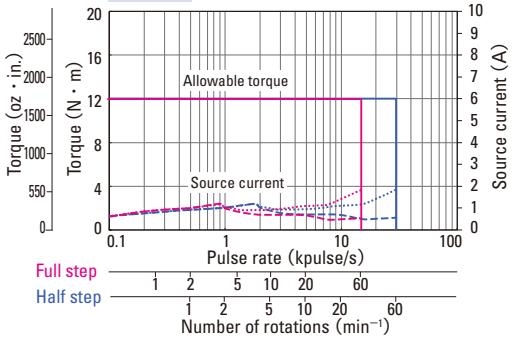
Characteristics

Operating current : 0.75A/phase
Use the rubber coupling

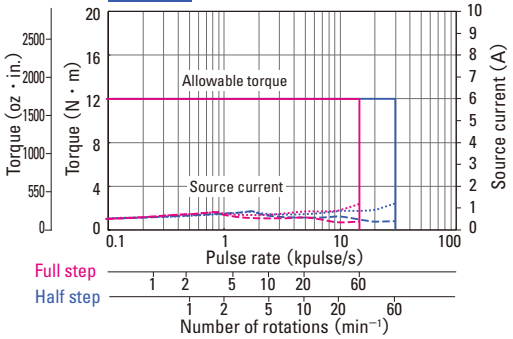
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

FSF851S-CX30 FSF851D-CX30

AC100V

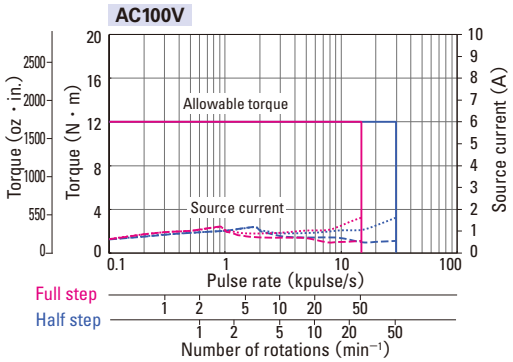


AC200V



FSF851S-CX36 FSF851D-CX36

AC100V



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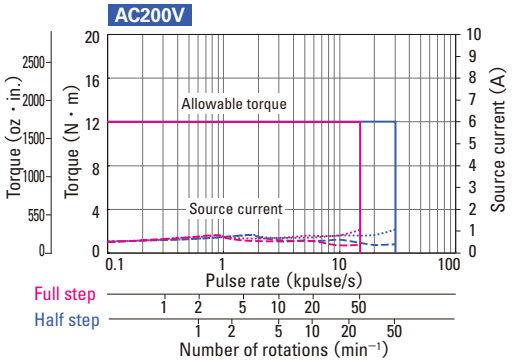


In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Harmonic gear model AC input Driver (Model number : FS1W075P00) + Harmonic gear motor

Rated current : 0.75A/phase

Motor size		42mm sq. (1.65inch sq.)			60mm sq. (2.36inch sq.)
Motor + gear length		73.5 mm (2.89inch)	73.5 mm (2.89inch)	73.5 mm (2.89inch)	113.5mm (4.47inch)
Single shaft	Set ordering model no.	FSF551S-HX30	FSF551S-HX50	FSF551S-HX100	FSF781S-HX50
	Corresponding motor model number	103F5505-70HXJ5	103F5505-70HXL5	103F5505-70HXM5	103F7851-70HXL4
Double shaft	Set ordering model no.	FSF551D-HX30	FSF551D-HX50	FSF551D-HX100	FSF781D-HX50
	Corresponding motor model number	103F5505-70HXJ2	103F5505-70HXL2	103F5505-70HXM2	103F7851-70HXL1
Allowable torque	N · m (OZ · in)	2.2 (311.5)	3.5 (495.6)	5 (708.1)	5.5 (778.8)
Momentary allowable torque	N · m (OZ · in)	4.5 (637.3)	8.3 (1175.4)	11 (1557.7)	14 (1982.6)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	0.042 (0.23)	0.042 (0.23)	0.042 (0.23)	0.31 (1.695)
Basic step angle	DEG	0.024	0.0144	0.0072	0.0144
Gear ratio	-	1:30	1 : 50	1 : 100	1 : 50
Hysteresis loss	Minute	3.6	2.4	2.4	-
Lost motion	Minute	-	-	-	0.4 to 3 ± 0.28N · m (3.965oz · in)
Allowable speed	min^{-1}	116	70	35	70
Motor mass (Note1)	kg (lbs)	0.43 (0.94)	0.43 (0.94)	0.43 (0.94)	1.2 (2.64)
Allowable thrust load	N (lbs)	1150 (258.75)	1150 (258.75)	1150 (258.75)	400 (90)
Allowable radial load (Note2)	N (lbs)	275 (61.88)	275 (61.88)	275 (61.88)	360 (81)

Note: The gear output shaft rotates in the opposite direction. (Note1) Driver mass ▶ P.29 (Note2) When load is applied at 1/3 length from output shaft edge.

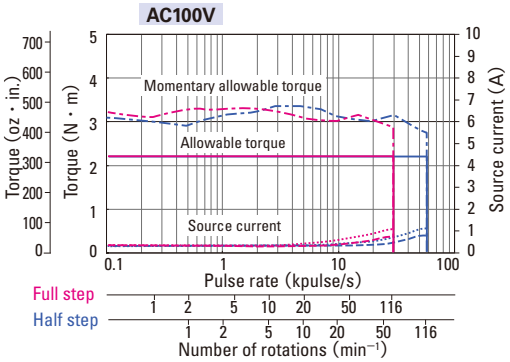
Characteristics

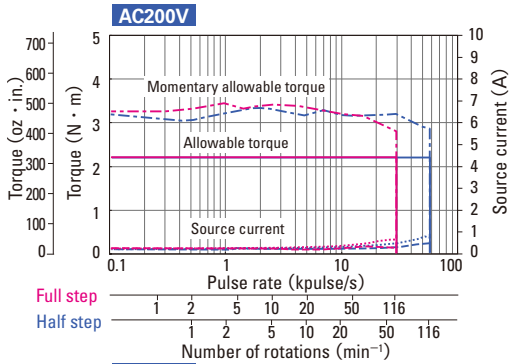
Operating current : 0.75A/phase
Use the rubber coupling

Momentary allowable torque Full step Half step
Source current (load applied) Full step Half step

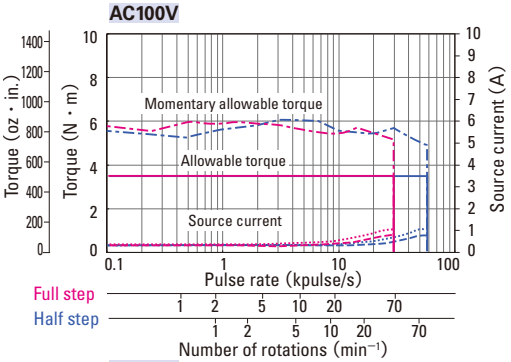
Allowable torque Full step Half step
Source current (no load) Full step Half step

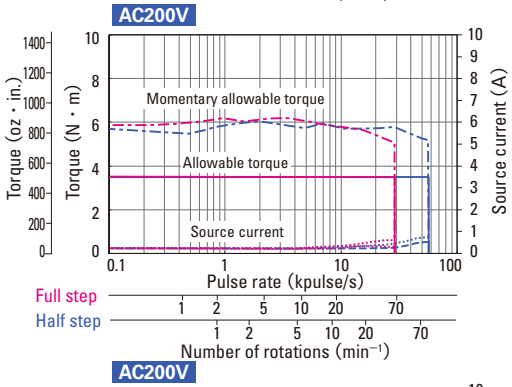
FSF551S-HX30 FSF551D-HX30



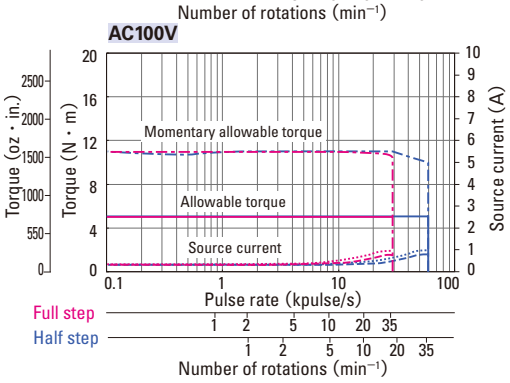


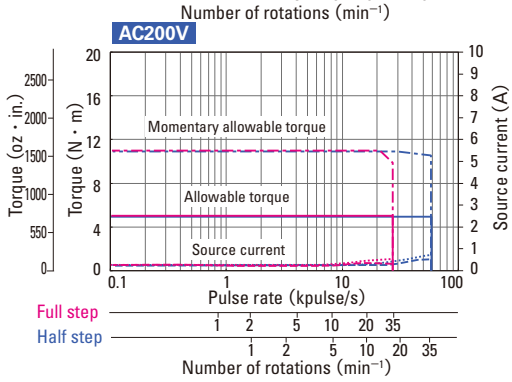
FSF551S-HX50 FSF551D-HX50



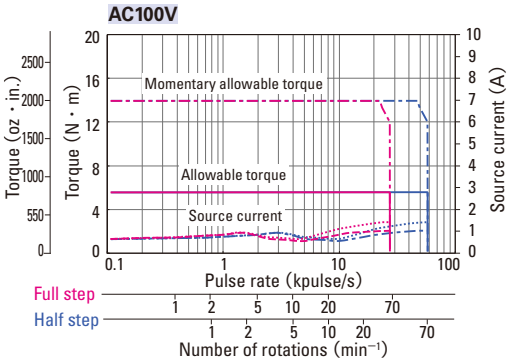


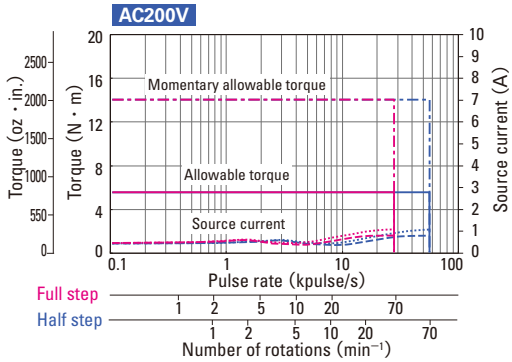
FSF551S-HX100 FSF551D-HX100





FSF781S-HX50 FSF781D-HX50





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its momentary allowable torque will not be exceeded.
System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.102 to 103 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Harmonic gear model AC input Driver (Model number : FS1W075P00) + Harmonic gear motor

Rated current : 0.75A/phase

Motor size		60mm sq. (2.36inch sq.)	ϕ86mm (ϕ3.39inch)	
Motor + gear length		113.5mm (4.47inch)	144.15mm (5.68inch)	144.15mm (5.68inch)
Single shaft	Set ordering model no.	FSF781S-HX100	FSF851S-HX50	FSF851S-HX100
	Corresponding motor model number	103F7851-70HXM4	103F8581-70HXL4	103F8581-70HXM4
Double shaft	Set ordering model no.	FSF781D-HX100	FSF851D-HX50	FSF851D-HX100
	Corresponding motor model number	103F7851-70HXM1	103F8581-70HXL1	103F8581-70HXM1
Allowable torque	N · m (OZ · in)	8 (1132.9)	25 (3540.2)	40 (5664.3)
Momentary allowable torque	N · m (OZ · in)	20 (2832.2)	34 (4814.8)	59 (8355.1)
Rotor inertia	X 10^{-4}kg · m² (OZ · in²)	0.31 (1.695)	1.65 (9.021)	1.65 (9.021)
Basic step angle	DEG	0.0072	0.0144	0.0072
Gear ratio	-	1 : 100	1 : 50	1 : 100
Hysteresis loss	Minute	-	-	-
Lost motion	Minute	0.4 to 1.5 ± 0.4N · m (56.645oz · in)	0.4 to 3 ± 1N · m (141.612oz · in)	0.4 to 3 ± 1.2N · m (169.934oz · in)
Allowable speed	min^{-1}	35	70	35
Motor mass (Note1)	kg (lbs)	1.2 (2.64)	3.3 (7.26)	3.3 (7.26)
Allowable thrust load	N (lbs)	400 (90)	1400 (315)	1400 (315)
Allowable radial load (Note2)	N (lbs)	360 (81)	1380 (310.5)	1380 (310.5)

Note: The gear output shaft rotates in the opposite direction. (Note1) Driver mass ▶ P.29 (Note2) When load is applied at 1/3 length from output shaft edge.

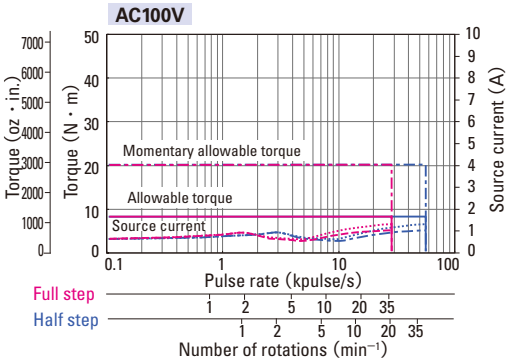
Characteristics

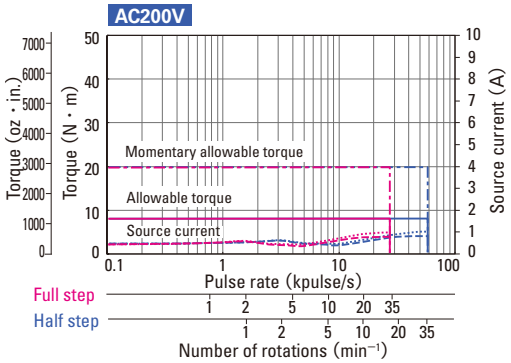
Operating current : 0.75A/phase
Use the rubber coupling

Momentary allowable torque Full step Half step
Source current (load applied) Full step Half step

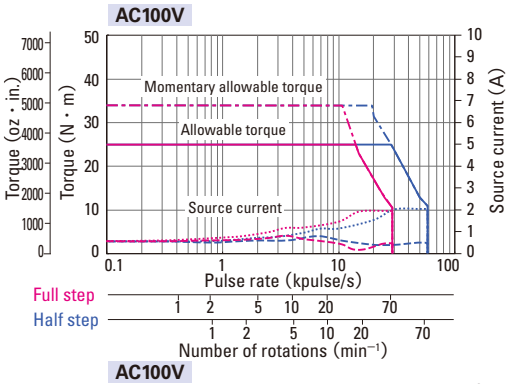
Allowable torque Full step Half step
Source current (no load) Full step Half step

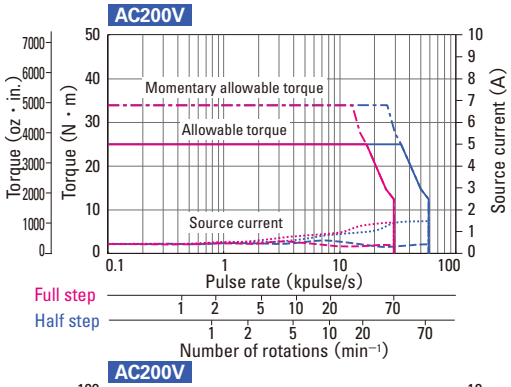
FSF781S-HX100 FSF781D-HX100



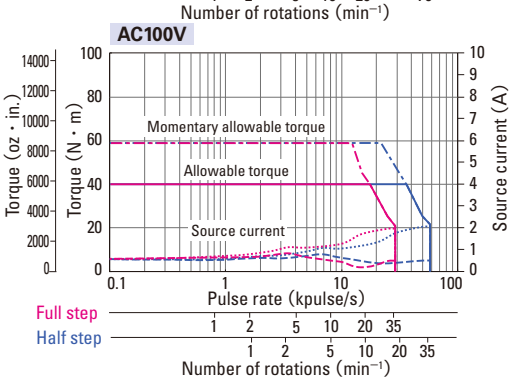


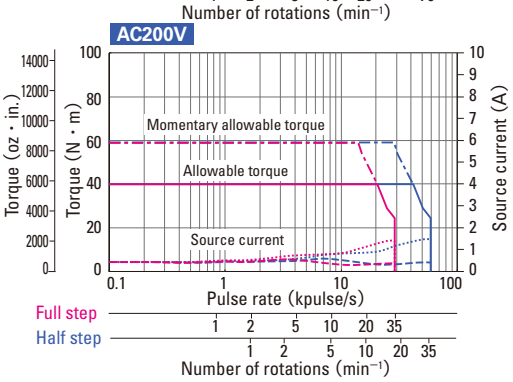
FSF851S-HX50 FSF851D-HX50





FSF851S-HX100 FSF851D-HX100





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its momentary allowable torque will not be exceeded.
System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.102 to 103 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Electromagnetic brake model AC input Driver (Model number : FS1W075P00) + Electromagnetic brake motor

Basic step angle : 0.72° Rated current : 0.75A/phase

Motor size			42mm sq. (1.65 inch sq.)			60mm sq. (2.36inch sq.)
Motor + brake length			64.5mm (2.54inch)	70.5mm (2.78inch)	79.5mm (3.13inch)	85.8mm (3.38inch)
Set ordering model no.			FSF551S-XB	FSF552S-XB	FSF554S-XB	FSF781S-XB
Corresponding motor model number			103F5505-70XB41	103F5508-70XB41	103F5510-70XB41	103F7851-70XB41
Holding torque		N · m (OZ · in)	0.13 (8.4)	0.18 (25.49)	0.26 (36.82)	0.6 (85.0)
Rotor inertia		X 10^{-4}kg · m^2 (OZ · in^2)	0.045 (0.246)	0.068 (0.372)	0.08 (0.437)	0.43 (2.351)
Motor mass (Note1)		kg (lbs)	0.38 (0.84)	0.43 (0.95)	0.52 (1.14)	0.94 (2.07)
Allowable thrust load		N (lbs)	10 (2.25)	10 (2.25)	10 (2.25)	20 (4.5)
Allowable radial load (Note2)		N (lbs)	35 (8.75)	35 (8.75)	35 (8.75)	80 (18)
Brake type		-	No excitation actuating type	No excitation actuating type	No excitation actuating type	No excitation actuating type
Electromagnetic brake	Power supply input	V	DC24V ± 5%	DC24V ± 5%	DC24V ± 5%	DC24V ± 5%
	Excitation current	A	0.08	0.08	0.08	0.25
	Power consumption	W	2	2	2	6
	Static friction torque	N · m (OZ · in)	0.3 (42.48)	0.3 (42.48)	0.3 (42.48)	0.8 (113.29)
	Brake operating time	ms	20	20	20	20
	Brake release time	ms	30	30	30	30

(Note1) Driver mass ▶ P.29

(Note2) When load is applied at 1/3 length from output shaft edge.

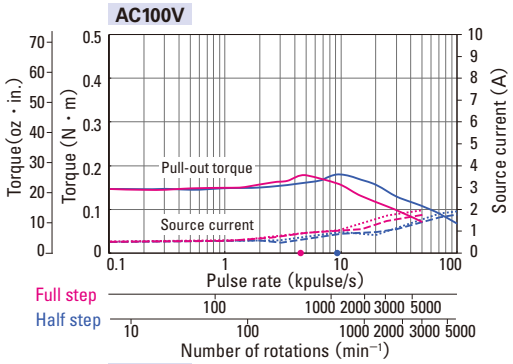
Characteristics

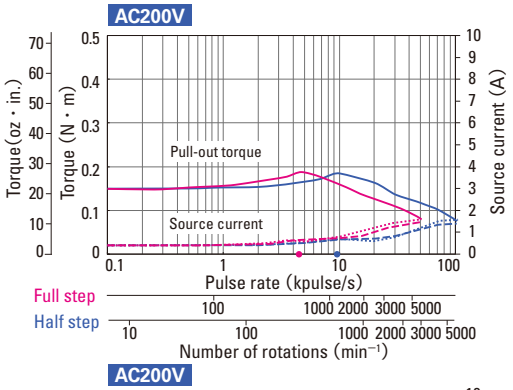
Operating current : 0.75A/phase
Use the rubber coupling

Pull-out torque Full step Half step
Source current (no load) Full step Half step

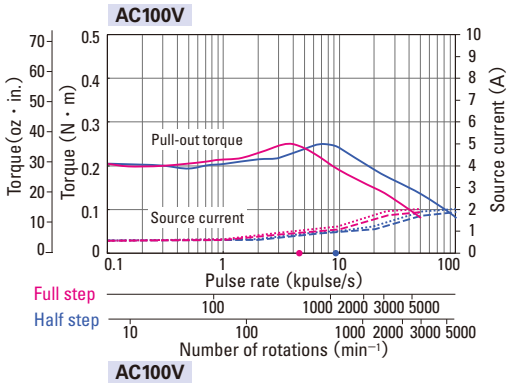
fs : Maximum self-start frequency when not loaded Full step Half step
Source current (load applied) Full step Half step

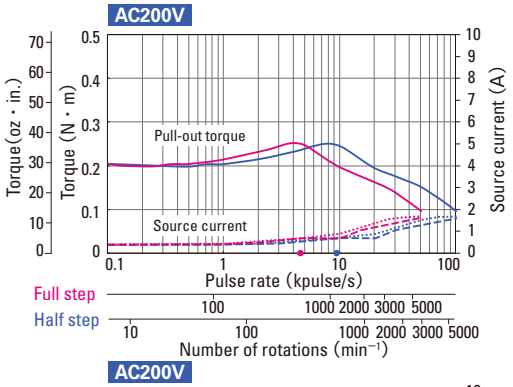
FSF551S-XB



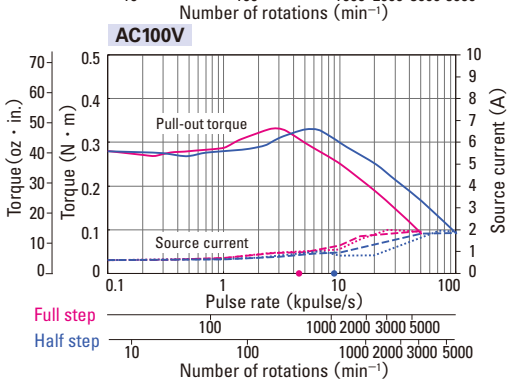


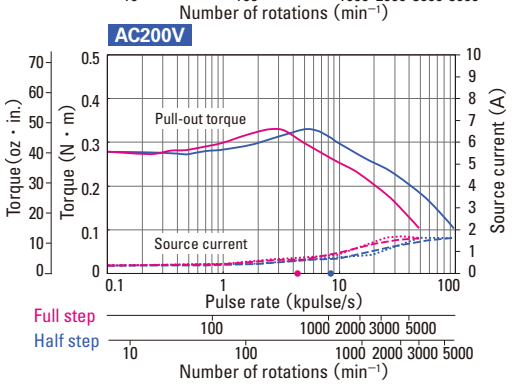
FSF552S-XB



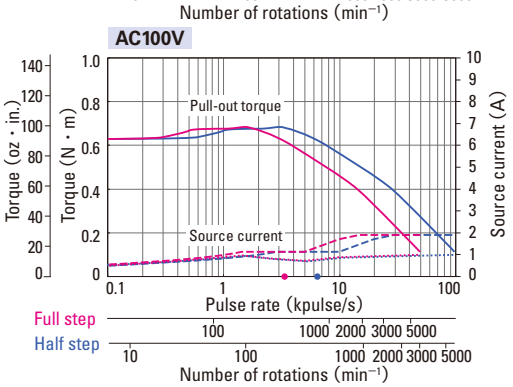


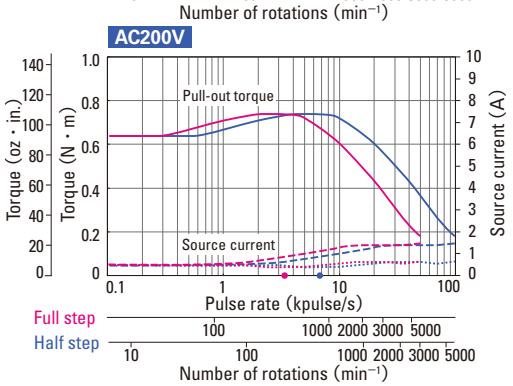
FSF554S-XB





FSF781S-XB





The electromagnetic brake only works when the motor is stopped, and cannot be used for braking.

System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.104 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Electromagnetic brake model AC input Driver (Model number : FS1W075P00) + Electromagnetic brake motor

Basic step angle : 0.72° Rated current : 0.75A/phase

Motor size			60mm sq. (2.36inch sq.)		ϕ86mm (ϕ3.39inch)	
Motor + brake length			94.5mm (3.72inch)	126.7mm (4.99inch)	116.7mm (4.59inch)	146.8mm (5.78inch)
Set ordering model no.			FSF782S-XB	FSF783S-XB	FSF851S-XB	FSF852S-XB
Corresponding motor model number			103F7852-70XB41	103F7853-70XB41	103F8581-70XB41	103F8582-70XB41
Holding torque		N · m (OZ · in)	0.93 (131.7)	1.79 (253.5)	2.06 (291.7)	4.02 (569.3)
Rotor inertia		X 10^{-4}kg · m^2 (OZ · in^2)	0.56 (3.062)	1 (5.468)	2.24 (12.247)	3.69 (20.175)
Motor mass (Note1)		kg (lbs)	1.12 (2.46)	1.7 (3.74)	3.5 (7.7)	4.5 (9.9)
Allowable thrust load		N (lbs)	20 (4.5)	20 (4.5)	60 (13.5)	60 (13.5)
Allowable radial load (Note2)		N (lbs)	80 (18)	80 (18)	220 (49.5)	220 (49.5)
Brake type		-	No excitation actuating type	No excitation actuating type	No excitation actuating type	No excitation actuating type
Electromagnetic brake	Power supply input	V	DC24V ± 5%	DC24V ± 5%	DC24V ± 5%	DC24V ± 5%
	Excitation current	A	0.25	0.25	0.42	0.42
	Power consumption	W	6	6	10	10
	Static friction torque	N · m (OZ · in)	0.8 (113.29)	0.8 (113.29)	5 (708)	5 (708)
	Brake operating time	ms	20	20	20	20
	Brake release time	ms	30	30	50	50

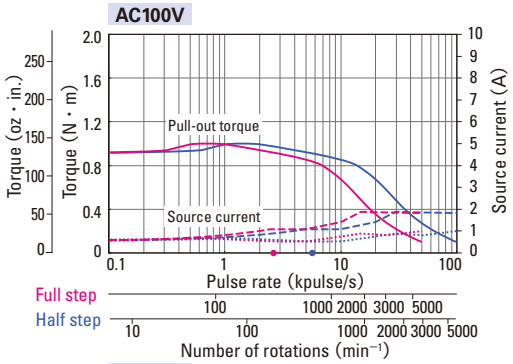
(Note1) Driver mass ▶ P.29
(Note2) When load is applied at 1/3 length from output shaft edge.

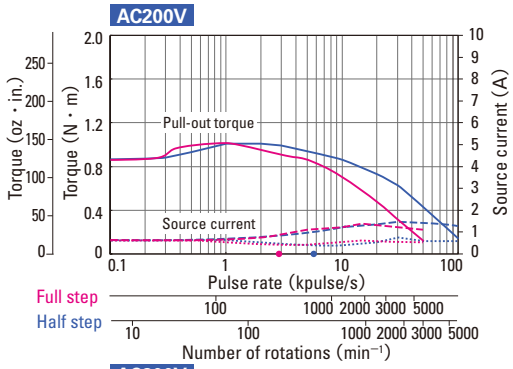
Characteristics

Operating current : 0.75A/phase
Use the rubber coupling

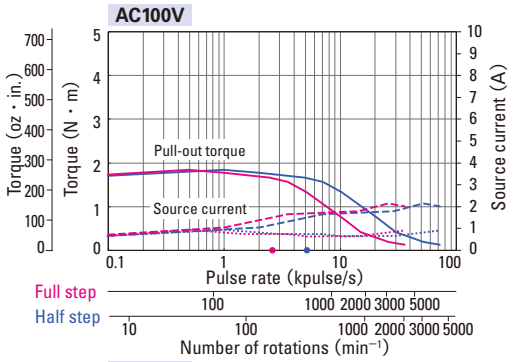
Pull-out torque Full step Half step
Source current (no load) Full step Half step
fs : Maximum self-start frequency when not loaded Full step Half step
Source current (load applied) Full step Half step

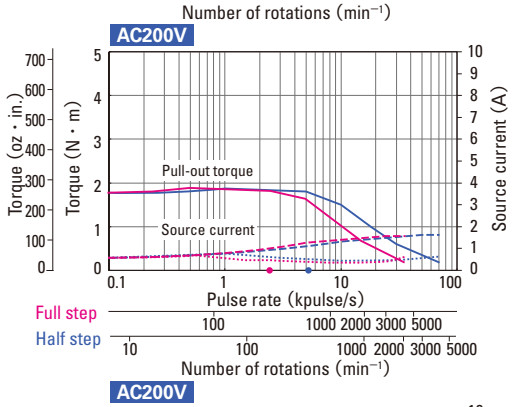
FSF782S-XB



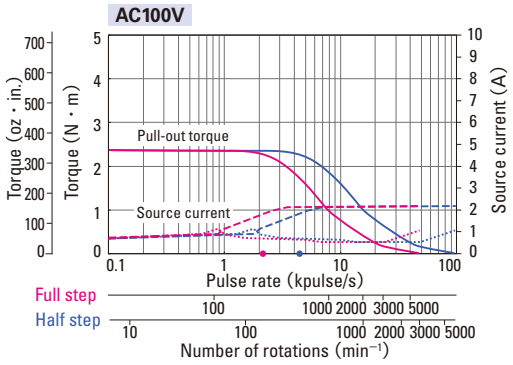


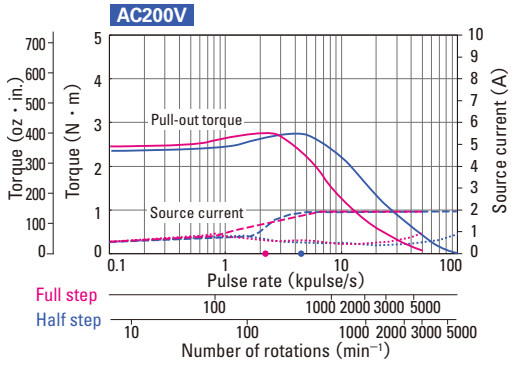
FSF783S-XB



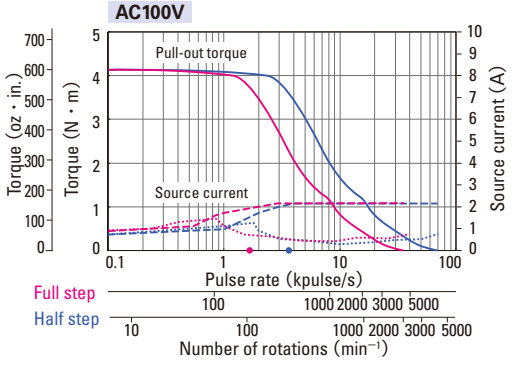


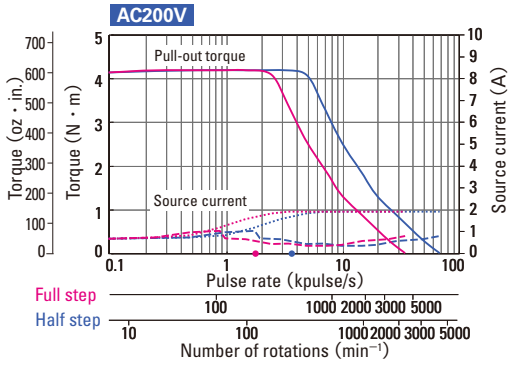
FSF851S-XB





FSF852S-XB





The electromagnetic brake only works when the motor is stopped, and cannot be used for braking.
System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.104 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size			⌀86mm (⌀3.39inch)
Motor + brake length			180.4mm (7.10inch)
Set ordering model no.			FSF853S-XB
Corresponding motor model number			103F8583-70XB41
Holding torque		N · m (OZ · in)	6.17 (873.7)
Rotor inertia		X 10^{-4}kg · m^2 (OZ · in^2)	5.19 (28.376)
Motor mass (Note1)		kg (lbs)	5.5 (12.1)
Allowable thrust load		N (lbs)	60 (13.5)
Allowable radial load (Note2)		N (lbs)	220 (49.5)
Brake type		-	No excitation actuating type
Electromagnetic brake	Power supply input	V	DC24V ± 5%
	Excitation current	A	0.42
	Power consumption	W	10
	Static friction torque	N · m (OZ · in)	5 (708)
	Brake operating time	ms	20
	Brake release time	ms	50

(Note1) Driver mass ▶ P.29
(Note2) When load is applied at 1/3 length from output shaft edge.

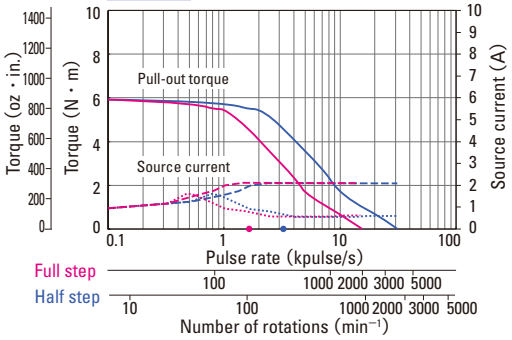
Characteristics

Operating current : 0.75A/phase
Use the rubber coupling

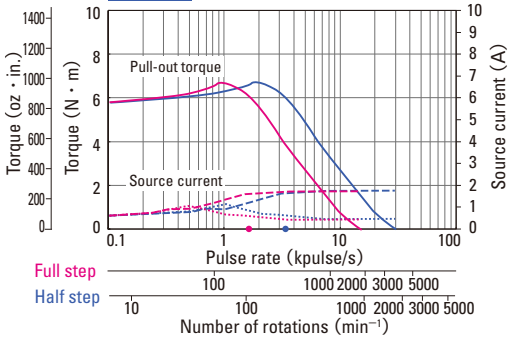
Pull-out torque Full step Half step
Source current (no load) Full step Half step
fs : Maximum self-start frequency when not loaded Full step Half step
Source current (load applied) Full step Half step

FSF853S-XB

AC100V



AC200V



The electromagnetic brake only works when the motor is stopped, and cannot be used for braking.
System configuration ▶ P.8 Set Model Configuration ▶ P.10 Motor dimensions ▶ P.104 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor specifications

General specifications

Model number	103F55 □□	103F785 □／103F858 □	103F8958 □	103M55 ○○／103M785 ○／103M858 ○	103M8958 ○
Specification type	—			S1 (continuous operation)	
Ambient operation temperature	− 10 to + 50℃ (0 to + 40℃ for harmonic gear model)			− 10 to + 40℃	
Storage temperature	− 20 to + 65℃			− 20 to + 60℃	
Ambient operation humidity	20 to 90% RH (no condensation)			95% RH Max.: Under 40℃, 57% RH Max.: Under 50℃, 35% RH Max.: Under 60℃ (no condensation)	
Storage humidity	5 to 95% RH (no condensation)				
Operation altitude	1000 m (3280 feet) MAX. above sea level			1000 m (3280 feet) MAX. above sea level	
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 147 m/s² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.				
Impact resistance	490m/s² of acceleration for 11 ms with half-sine wave applying three times for X, Y, and Z axes each, 18 times in total.				
Insulation class	Class B (+ 130℃)			Class B (+ 130℃) [UL class A (+ 105℃)]	
Withstand voltage	At normal ambient temperature and humidity, no failure with 1500 V AC @50/60 Hz applied for one minute between motor winding and frame.				
Insulation resistance	At normal ambient temperature and humidity, 100 Mohm or more on megger with 500 V DC between motor winding and frame.				
Protection grade	IP40				
Wiringtemperature increase	80K MAX. (Based on Sanyo Denki standard)			80K MAX. (Based on Sanyo Denki standard)	
Axial play (Note1)	0.075mm (0.002952inch) MAX., Load 4.4N (1lbs)	0.075mm (0.002952inch) MAX., Load 9N (2lbs)	0.075mm (0.002952inch) MAX., Load 9N (2lbs)	0.075mm (0.002952inch) MAX., Load 9N (2lbs)	0.075mm (0.002952inch) MAX., Load 9N (2lbs)
Radial play (Note2)	0.025mm (0.00098inch) MAX., Load 4.4N (1lbs)			0.025mm (0.00098inch)MAX., Load 4.4N (1lbs)	0.025mm (0.00098inch) MAX., Load 4.4N (1lbs)
Shaft runout	0.025mm	0.025mm	0.05mm	0.025mm	0.05mm
Inserted part concentricity against shaft	ϕ 0.05mm	ϕ 0.075mm	ϕ 0.075mm	ϕ 0.075mm	ϕ 0.075mm
Fitted surface angularity against shaft	0.1mm	0.1mm	0.1mm	0.1mm	0.1mm

(Note1) Axial play: Shaft displacement under axial load.
(Note2) Radial play: Shaft displacement under radial load applied 1/3rd of the length from the end of the shaft.

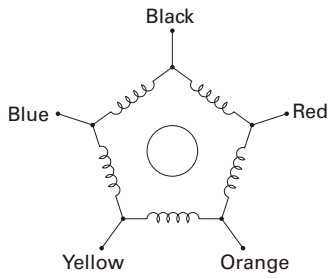
Safety standards

Type code : 103M55 ○○ /103M785 ○ /103M858 ○ /103M8958 ○ (CE / UL model)

CE	Directives	Standard part	
	Low-voltage directives	EN-60034-1, IEC34-5, (EN-60034-5)	
UL	Acquired standards	Standard part	File No.
	UL	UL1004, UL2111	E208878
	UL for Canada (c-UL)		

Internal wire connection

Connection Method: Pentagon



Direction of motor rotate

The direction of motor rotate is counterclockwise when viewed from the output shaft side at the direct current energization in the following order.

This is an instance of the standard model, the electromagnetic brake model and the CE / UL model.
As for some of the models with the gear, the direction of motor rotation is different, please make inquiries.

		Exciting order									
		1	2	3	4	5	6	7	8	9	10
Color of leads	Black	−	−	−	−		+	+	+	+	
	Red		+	+	+	+		−	−	−	−
	Orange	+		−	−	−	−		+	+	+
	Yellow	−	−		+	+	+	+		−	−
	Blue	+	+	+		−	−	−	−		+

Driver specifications

General specifications

Basic specifications	Model number		**FS1W075P00**
	Power supply		Single phase AC100V to 230V + 10, − 15%, 50/60Hz
	Source current		4A Max.
	Environment	Protection class	Class Ⅰ
		Operation environment	Installation category (over-voltage category) : Ⅱ (CE), Pollution level : 2
		Ambient operation temperature	0 to + 50℃
		Storage temperature	− 20 to + 70℃
		Ambient operation humidity	35 to 85%RH (no condensation)
		Storage humidity	10 to 90%RH (no condensation)
		Operation altitude	1000 m (3280 feet) MAX. above sea level
		Vibration resistance	Tested under the following conditions ; 5m/s², frequency range 10 to 55Hz, direction along X, Y and Z axes, for 2 hours each
		Impact resistance	Not influenced at NDS-C-0110 standard section 3.2.2 division "C".
		Withstand voltage	Not influenced when 1500V AC is applied between power input terminal and cabinet for one minute.
		Insulation resistance	10M ohm MIN. when measured with 500V DC megohmmeter between input terminal and cabinet.
	Mass		0.8kg
Functions	Protection functions		Driver overheating, main circuit power supply error, and over-current
	LED indication		Electric power monitor, phase origin monitor, pulse monitor, alarm indications (overcurrent, overheating protection, supply under- and overvoltage, hardware fault, motor disconnection or non-standard motor connection)
Signal	Input signal		Photo-coupler input system ; input resistance: 220 Ω ; input-signal "H" level : 4.0 to 5.5V ; input-signal "L" level : 0 to 0.5V
	Output signal		From the photo coupler by the open collector output Output specification : Vceo = 30V MAX., Ic = 5mA

Safety standards

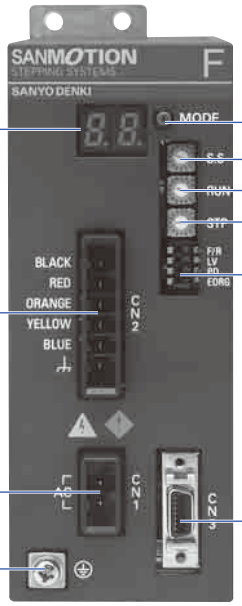
CE (TÜV)	Directives	Category	Standard part	Name
	Low-voltage directives	−	EN50178	−
	EMC directives	Emission	EN55011-A	Terminal disturbance voltage
			EN55011-A	Electromagnetic radiation disturbance
		Immunity	EN61000-4-2	ESD (Electrostatic discharge)
			EN61000-4-3	RS (Radio-frequency amplitude modulated electromagnetic field)
			EN61000-4-4	Fast transionts
			EN61000-4-6	Surges
			EN61000-4-5	CS (Radio-frequency common mode)
			EN61000-4-11	Voltage dips, Voltage interruptions
UL	Acquired standards		Standard part	File No.
	UL		UL508C	E179775
	UL for Canada (c-UL)			

・EMC characteristics may vary depending on the configuration of the users' control panel, which contains the driver or stepping motor, or the arrangement and wiring of other electrical devices.
・Validation test of driver has been performed for low-voltage EMC directives at TUV (TUV SUD Japan) for self-declaration of CE marking.

Driver Controls and Connectors

2-digit LED indication

	Indication	Description
Status	8.8	Internal power is established.
	8.8	Excitation phase is origin status at power on.
	8.8	Command pulse is under status at input.
Alarm	01	Over-current
	02	Overheat
	03	Low voltage power
	04	Over-voltage power
	05 to 08	Hardware fault
	06	Motor is not connected or motor that is not in compliance with standards is connected.



Display switch — Alarm history of 10 previous alarms can be displayed on 2-digit LED.

1 Step angle selection switch

2 Current selection switch

3 0-speed current adjustment switch

4 Function selection DIP switch

Motor interface connector

Power connector

Earth

5 Input/output signal interface connector

1 Step angle selection switch (S.S)

Basic step angle divisor (up to 250 divisions).

Indication	0	1	2	3	4	5	6	7
Number of divisions	1	2	2.5	4	5	8	10	20
Indication	8	9	A	B	C	D	E	F
Number of divisions	25	40	50	80	100	125	200	250

Initial configuration of factory shipment is set to 1 (Half steps).

2 Operation current selection switch (RUN)

Motor current during operation can be selected from 100 to 25%.

Indication	0	1	2	3	4	5	6	7
Motor current (%)	100 (Rated value)	95	90	85	80	75	70	65
Indication	8	9	A	B	C	D	E	F
Motor current(%)	60	55	50	45	40	35	30	25

Initial configuration of factory shipment is set to 0 (rated value).

3 Current adjustment at operation halt switch (STP)

Motor current at 0-speed can be selected from 100 to 25%.

Indication	0	1	2	3	4	5	6	7
Motor current (%)	100 (Rated value)	95	90	85	80	75	70	65
Indication	8	9	A	B	C	D	E	F
Motor current (%)	60	55	50	45	40	35	30	25

Initial configuration of factory shipment is set to A (50% of rated value).
Driver and motor should be operated at around 50% of rated value to reduce heat.

5 Input/output signal interface connector

This connector is for host system connection.
The driver-side connector is 10214-52A2JL (Sumitomo 3M).

	6		4		2			
	PD-		CCW−(U/D−)		CW−(CK−)			
7		5		3		1		
Reserved		PD+		CCW+(U/D+)		CW+(CK+)		
	13		11		9			
	AL(collector)		MON(collector)		EXT			
14		12		10		8		
AL(emitter)		MON(emitter)		F / H		Input common		

Terminal arrangement of CN3 connector

4 Function selection DIP switch

Selects an appropriate function for specification.

Factory default settings

	OFF ON		
F/R		OFF	Input method select
LV		OFF	Low-vibration mode select
PD		OFF	Power down select
EORG		OFF	Excitation select

Input method select (F/R)

Selects input pulse type.

F/R	Input pulse type
ON	1 input (CK,U/D)
OFF	2 input (CW,CCW)

Low-vibration mode select (LV)

Low-vibration and smooth drive even with coarse resolution of one or two divisions (full-/half-step) settings.

LV	Operation
ON	Auto-micro function
OFF	Micro-step

Power down select (PD)

Selects current for power down signal input.

PD	Motor current
ON	Current by rotary switch STP (power low)
OFF	0A (power off)

Excitation select (EORG)

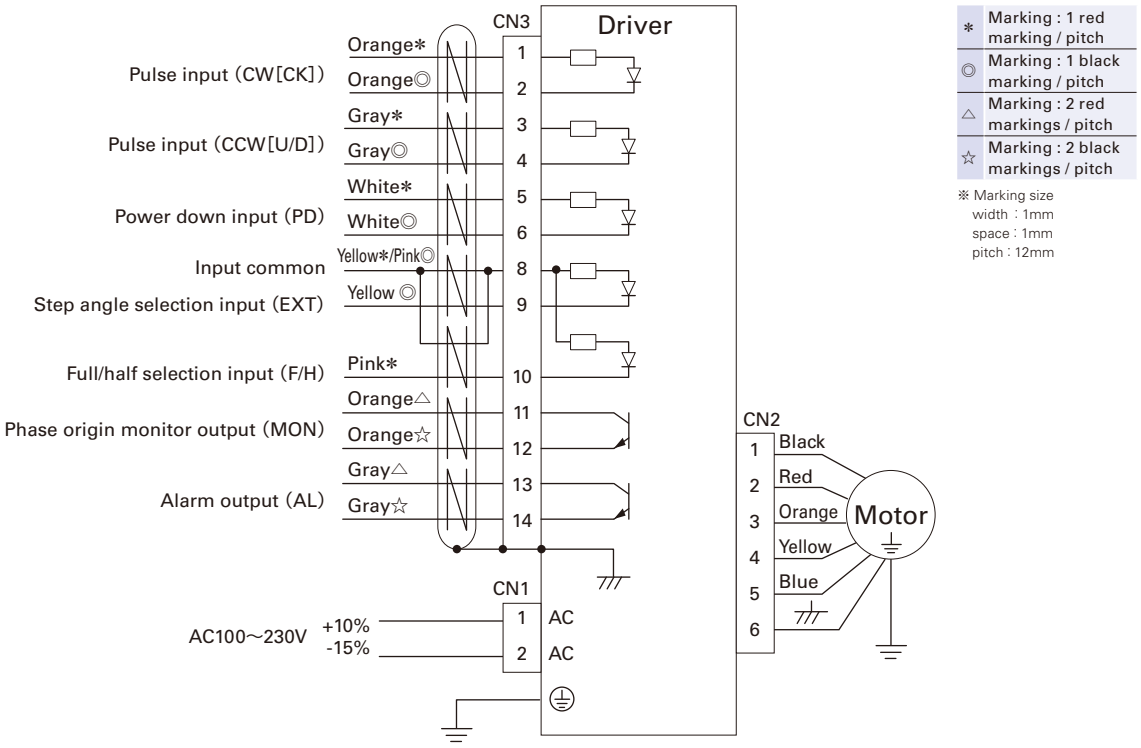
The excitation phasse when the power supply is turned on is selected.

EORG	Original excitation phase
ON	Excitation phase at power shut off
OFF	Phase origin

By turning on the EORG, excitation phase when power OFF will be saved.
Therefore, there will be no shaft displacement when turning the power ON.

Connections and Signals

External wiring diagram



Applicable wire sizes

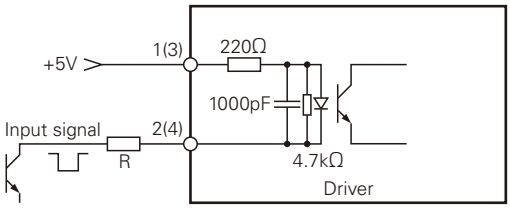
Motor size	42mm sq. (1.65inch sq.)	60mm sq. (2.36inch sq.)	ϕ86mm (ϕ3.39inch)	ϕ106mm (ϕ4.17inch)
Power supply	AWG18 (0.75mm²) Min.			
Input/output signal	AWG24 (0.2mm²) to 30 (0.05mm²) (twisted pairs in bundle shield)			
Motor	AWG26 (0.15mm²) Min.	AWG22 (0.3mm²) Min.	AWG22 (0.3mm²) Min.	AWG18 (0.75mm²) Min.
Earth	AWG18 (0.75mm²) Min.			

Specification summary of CN3 I/O signal

Signal name	CN3 Pin number	Function
CW pulse input (standard)	1 2	When using "2-input mode" Drive pulse for the CW direction rotation is input.
Pulse column input	1 2	When using "Pulse and direction mode" Drive pulse train for the stepping motor rotation is input.
CCW pulse input (standard)	3 4	When using "2-input mode" Drive pulse for the CCW direction rotation is input.
Rotation direction input	3 4	The rotation direction signal of stepping motor is input for the "Pulse and direction mode". Internal photocoupler ON ··· CW direction Internal photocoupler OFF ··· CCW direction
Power down input	5 6	Inputting the PD signal cuts OFF the current flowing through the stepping motor (turns OFF the power). (The power down input can be changed to the power low function by selecting dipswitches.) PD input signal ON (internal photocoupler ON) ···PD function enabled PD input signal OFF (internal photocoupler OFF) ···PD function disabled
Step-angle selection input	8 9	Apply EXT signal to enable full-/half-step selection (input). EXT input signal ON (internal photocoupler ON) ··· full/half external input signal enabled. EXT input signal OFF (internal photocoupler OFF) ··· rotary switch SS enabled.
FULL/HALF selection input	8 10	When the EXT input signal is ON (internal photocoupler ON). F/H input signal ON (internal photocoupler ON) ··· HALF step F/H input signal OFF (internal photocoupler OFF) ··· FULL step
Phase origin monitor output	11 12	It is turned ON when the excitation phase is at the origin (in the state when the power is turned ON) It is turned ON once per 10 pulses when setting to HALF step. It is turned ON once per 20 pulses when setting to FULL step.
Alarm output	13 14	When an alarm circuit in the driver is tripped, an external signal is output (photocopuler ON). At this time, the stepping motor is de-energized.

(Note) The CW rotation direction of stepping motor means the clockwise direction rotation as viewed from the output shaft side (ange side).
The CCW rotation direction means the counterclockwise direction rotation as viewed from the output shaft side (ange side).

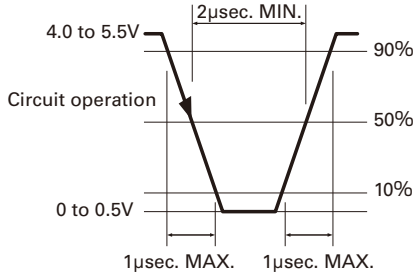
Input circuit configuration of CW (CK), CCW (U/D)



- Pulse duty 50% MAX.
- Maximum input frequency: 250kpulse/s
- When the crest value of the input signal exceeds 5V,
- use the external limit resistance R to limit the input current to approximately 15mA.

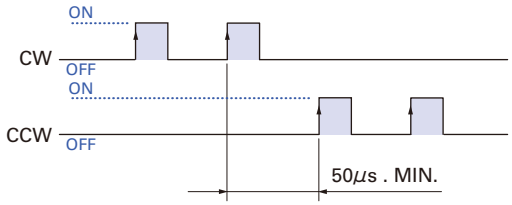
Input signal specification

〈Photo coupler〉



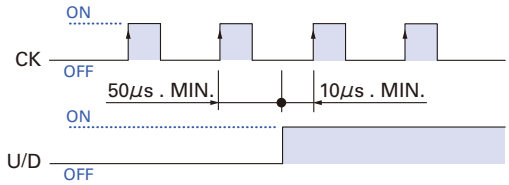
Timing of command pulse

2 input type (CW,CCW)



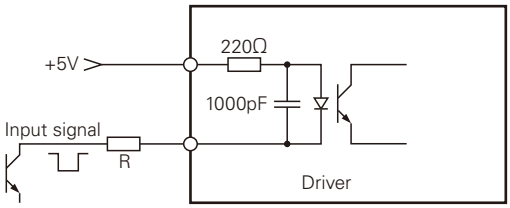
- The shaded regions in the diagram indicate when the internal photocoupler is ON. The internal circuit (motor) is active at the rising edge of the photocoupler pulses.
- To apply pulse to CW, set CCW side internal photo coupler to “OFF”.
- To apply pulse to CCW, set CW side internal photo coupler to “OFF”.

1 input type (CK, U/D)



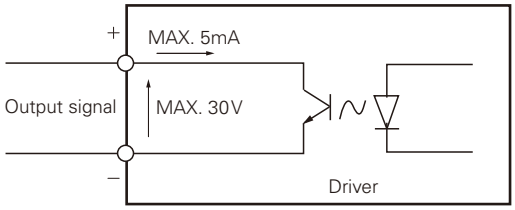
- The shaded regions in the diagram indicate when the internal photocoupler is ON. The internal circuit (motor) is active at the rising edge of the CK-side photocoupler pulses.
- Switching of U/D input signal must be done while CK side internal photo coupler is “OFF”.

Input circuit configuration of PD, EXT, F/H

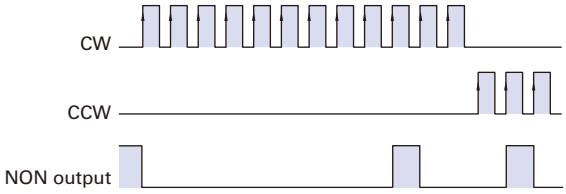


- If the peak value exceedes 5V, set the input current to approx. 15mA using the external limit resistance R.

Output signal configuration of MON, AL



MON output

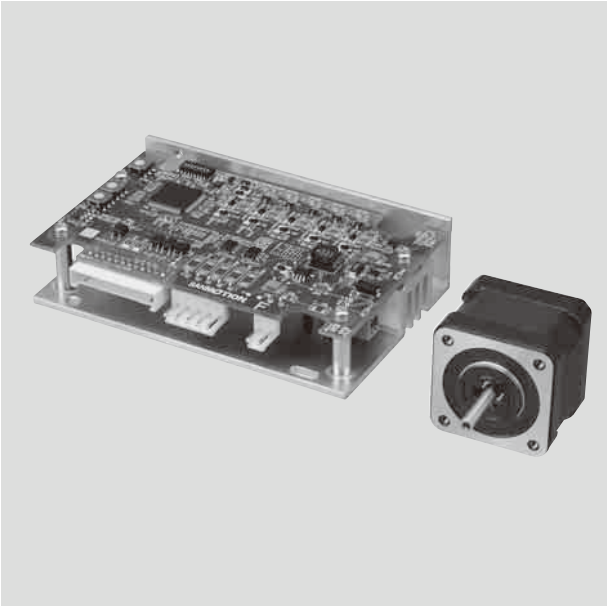


- Photo coupler at phase origin of motor excitation (status at power on) is set to “ON”.
- Output from MON is set to on at every 7.2 degrees of motor output shaft from phase origin.

Ex.) Setting when number of division is 1 (full step)

DC input Set model
Micro step

Set Model Configuration ▶P.36
Specifications · Characteristics ▶P.38 to 52
Motor specifications ▶P.53 Driver specifications ▶P.54
Motor dimensions ▶P.97 to 104 Driver dimensions ▶P.105



Features

- The auto-micro function provides low vibration and smooth drive even with coarse resolution setting of one or two divisions (full-/half-step), and supports micro steps of 250 divisions.
- High precision current detection reduces speed fluctuations by 50% compared with former model.※

※ Model No.: F5PAE140P100. Our conventional product Model No.: PMDPC1S3P01

Set model configuration items

Driver

Model number : F5PAE140P100 Power supply : DC24V/48V

Motor

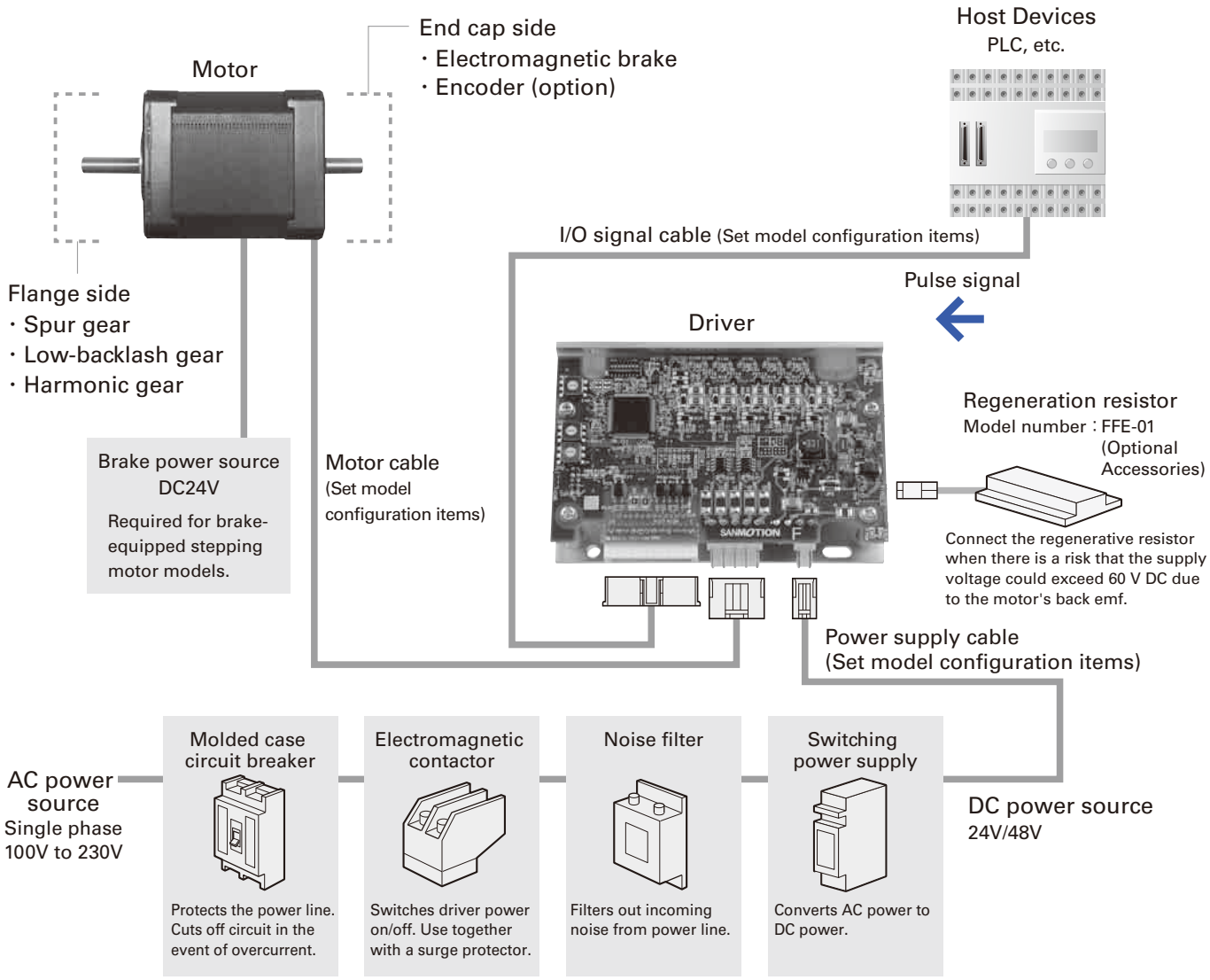
Motor size : 28mm sq. (1.10inch sq.), 42mm sq. (1.65inch sq.), 60mm sq. (2.36inch sq.), ϕ86mm. (ϕ3.39inch)

Cables with connectors

Power supply, Input/output signal, Motor (1m each)

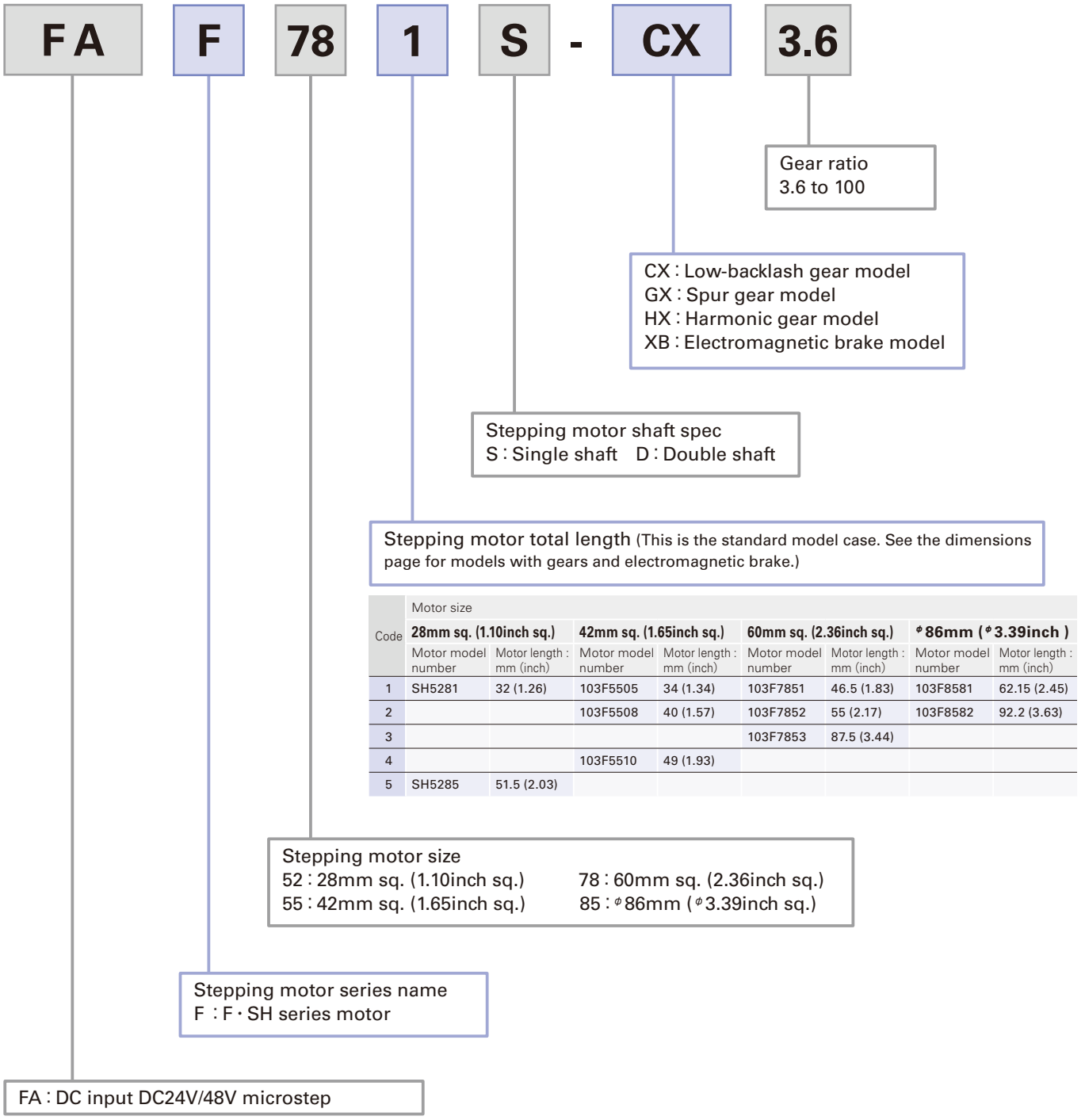
· Instruction manuals can be downloaded from our website.

System configuration



Model number convention

Example: The model number of the set with a DC input micro-step driver and motor model 103F7851-82CXA4 is composed as follows. This motor is specified as 60mm sq. (2.36inch sq.) and 92mm (3,62inch) long (motor + gear), single shaft, with low backlash gears.



Code	Motor size							
	28mm sq. (1.10inch sq.)		42mm sq. (1.65inch sq.)		60mm sq. (2.36inch sq.)		φ86mm (φ3.39inch)	
	Motor model number	Motor length : mm (inch)	Motor model number	Motor length : mm (inch)	Motor model number	Motor length : mm (inch)	Motor model number	Motor length : mm (inch)
1	SH5281	32 (1.26)	103F5505	34 (1.34)	103F7851	46.5 (1.83)	103F8581	62.15 (2.45)
2			103F5508	40 (1.57)	103F7852	55 (2.17)	103F8582	92.2 (3.63)
3					103F7853	87.5 (3.44)		
4			103F5510	49 (1.93)				
5	SH5285	51.5 (2.03)						

Set Model Configuration

Each set consists of a driver, motor, and cables with connectors

DC input driver Model No. : F5PAE140P100

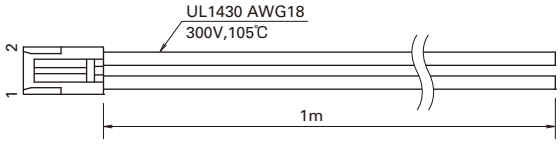
Basic step angle/0.72°

Model	Motor size	Single shaft		Double shaft		Rated current (A/phase)	Page	
		Set model number	Set model configuration items Motor model number	Set model number	Set model configuration items Motor model number		Specifications	Dimensions
Standard model	28mm sq. (1.10inch sq.)	FAF521S	SH5281-7241	FAF521D	SH5281-7211	0.75	P.38	P.97
		FAF525S	SH5285-7241	FAF525D	SH5285-7211	0.75	P.38	P.97
	42mm sq. (1.65inch sq.)	FAF551S	103F5505-8241	FAF551D	103F5505-8211	1.4	P.38	P.97
		FAF552S	103F5508-8241	FAF552D	103F5508-8211	1.4	P.38	P.97
		FAF554S	103F5510-8241	FAF554D	103F5510-8211	1.4	P.39	P.97
	60mm sq. (2.36inch sq.)	FAF781S	103F7851-8241	FAF781D	103F7851-8211	1.4	P.39	P.98
		FAF782S	103F7852-8241	FAF782D	103F7852-8211	1.4	P.39	P.98
		FAF783S	103F7853-8241	FAF783D	103F7853-8211	1.4	P.39	P.98
	φ86mm (φ3.39inch)	FAF851S	103F8581-8241	FAF851D	103F8581-8211	1.4	P.40	P.99
		FAF852S	103F8582-8241	FAF852D	103F8582-8211	1.4	P.40	P.99
Low-backlash gear model	42mm sq. (1.65inch sq.)	FAF551S-CX3.6	103F5505-82CXA4	FAF551D-CX3.6	103F5505-82CXA1	1.4	P.41	P.101
		FAF551S-CX7.2	103F5505-82CXB4	FAF551D-CX7.2	103F5505-82CXB1	1.4	P.41	P.101
		FAF551S-CX10	103F5505-82CXE4	FAF551D-CX10	103F5505-82CXE1	1.4	P.41	P.101
		FAF551S-CX20	103F5505-82CXG4	FAF551D-CX20	103F5505-82CXG1	1.4	P.41	P.101
		FAF551S-CX30	103F5505-82CXJ4	FAF551D-CX30	103F5505-82CXJ1	1.4	P.42	P.101
		FAF551S-CX36	103F5505-82CXK4	FAF551D-CX36	103F5505-82CXK1	1.4	P.42	P.101
	60mm sq. (2.36inch sq.)	FAF781S-CX3.6	103F7851-82CXA4	FAF781D-CX3.6	103F7851-82CXA1	1.4	P.42	P.101
		FAF781S-CX7.2	103F7851-82CXB4	FAF781D-CX7.2	103F7851-82CXB1	1.4	P.42	P.101
		FAF781S-CX10	103F7851-82CXE4	FAF781D-CX10	103F7851-82CXE1	1.4	P.43	P.101
		FAF781S-CX20	103F7851-82CXG4	FAF781D-CX20	103F7851-82CXG1	1.4	P.43	P.101
		FAF781S-CX30	103F7851-82CXJ4	FAF781D-CX30	103F7851-82CXJ1	1.4	P.43	P.101
		FAF781S-CX36	103F7851-82CXK4	FAF781D-CX36	103F7851-82CXK1	1.4	P.43	P.101
	φ86mm (φ3.39inch)	FAF851S-CX3.6	103F8581-82CXA4	FAF851D-CX3.6	103F8581-82CXA1	1.4	P.44	P.101
		FAF851S-CX7.2	103F8581-82CXB4	FAF851D-CX7.2	103F8581-82CXB1	1.4	P.44	P.101
		FAF851S-CX10	103F8581-82CXE4	FAF851D-CX10	103F8581-82CXE1	1.4	P.44	P.101
		FAF851S-CX20	103F8581-82CXG4	FAF851D-CX20	103F8581-82CXG1	1.4	P.44	P.101
		FAF851S-CX30	103F8581-82CXJ4	FAF851D-CX30	103F8581-82CXJ1	1.4	P.45	P.101
		FAF851S-CX36	103F8581-82CXK4	FAF851D-CX36	103F8581-82CXK1	1.4	P.45	P.101
Spur gear model	28mm sq. (1.10inch sq.)	FAF521S-GX3.6	SH5281-72GXA4	FAF521D-GX3.6	SH5281-72GXA1	0.75	P.46	P.102
		FAF521S-GX7.2	SH5281-72GXB4	FAF521D-GX7.2	SH5281-72GXB1	0.75	P.46	P.102
		FAF521S-GX10	SH5281-72GXE4	FAF521D-GX10	SH5281-72GXE1	0.75	P.46	P.102
		FAF521S-GX20	SH5281-72GXG4	FAF521D-GX20	SH5281-72GXG1	0.75	P.46	P.102
		FAF521S-GX30	SH5281-72GXJ4	FAF521D-GX30	SH5281-72GXJ1	0.75	P.47	P.102
		FAF521S-GX50	SH5281-72GXL4	FAF521D-GX50	SH5281-72GXL1	0.75	P.47	P.102
Harmonic gear model	28mm sq. (1.10inch sq.)	FAF521S-HX50	SH5281-72HXL4	FAF521D-HX50	SH5281-72HXL1	0.75	P.48	P.102
		FAF521S-HX100	SH5281-72HXM4	FAF521D-HX100	SH5281-72HXM1	0.75	P.48	P.102
	42mm sq. (1.65inch sq.)	FAF551S-HX30	103F5505-82HXJ5	FAF551D-HX30	103F5505-82HXJ2	1.4	P.48	P.102
		FAF551S-HX50	103F5505-82HXL5	FAF551D-HX50	103F5505-82HXL2	1.4	P.48	P.102
		FAF551S-HX100	103F5505-82HXM5	FAF551D-HX100	103F5505-82HXM2	1.4	P.49	P.102
	60mm sq. (2.36inch sq.)	FAF781S-HX50	103F7851-82HXL4	FAF781D-HX50	103F7851-82HXL1	1.4	P.49	P.103
		FAF781S-HX100	103F7851-82HXM4	FAF781D-HX100	103F7851-82HXM1	1.4	P.49	P.103
	φ86mm (φ3.39inch)	FAF851S-HX50	103F8581-82HXL4	FAF851D-HX50	103F8581-82HXL1	1.4	P.49	P.103
		FAF851S-HX100	103F8581-82HXM4	FAF851D-HX100	103F8581-82HXM1	1.4	P.50	P.103
Electromagnetic brake model	42mm sq. (1.65inch sq.)	FAF551S-XB	103F5505-82XB41	—	—	1.4	P.51	P.104
		FAF552S-XB	103F5508-82XB41	—	—	1.4	P.51	P.104
		FAF554S-XB	103F5510-82XB41	—	—	1.4	P.51	P.104
	60mm sq. (2.36inch sq.)	FAF781S-XB	103F7851-82XB41	—	—	1.4	P.51	P.104
		FAF782S-XB	103F7852-82XB41	—	—	1.4	P.52	P.104
		FAF783S-XB	103F7853-82XB41	—	—	1.4	P.52	P.104
	φ86mm (φ3.39inch)	FAF851S-XB	103F8581-82XB41	—	—	1.4	P.52	P.104
		FAF852S-XB	103F8582-82XB41	—	—	1.4	P.52	P.104

● **Cables with connectors** Included in all DC input sets (micro-step)

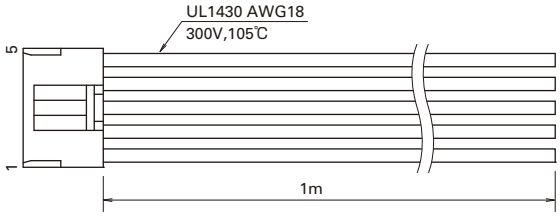
Power supply cable (Model number : FC3P0010A)

Pin number	Color
1	White
2	Black



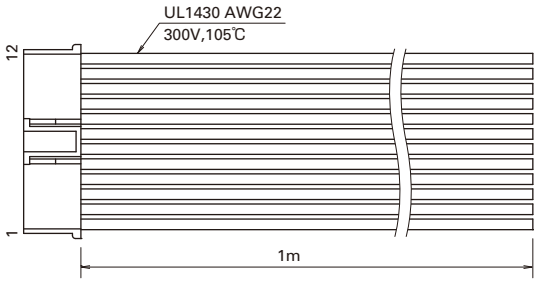
Stepping Motor Extension Cable (Model number : FC3M0010A)

Pin number	Color
1	Blue
2	Red
3	Orange
4	Green
5	Black



I/O signal cable (Model number : FC3S0010A)

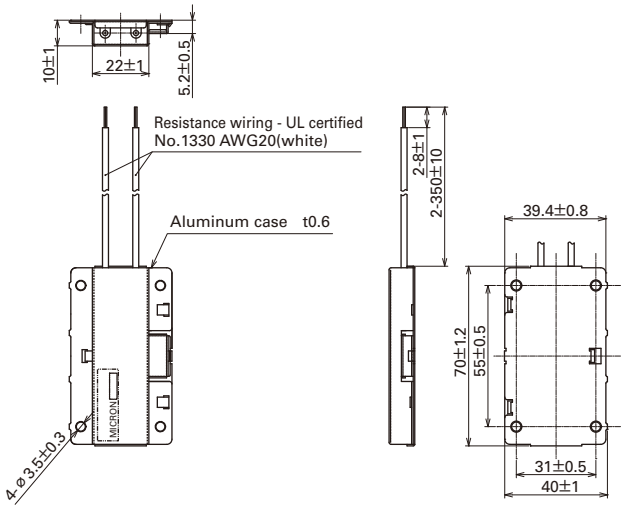
Pin number	Color
1	Blue
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	



Optional Accessories

● **Regeneration resistor**

Use when main supply voltage could exceed 60 V DC.



Model number	FFE-01
Rated current	60W (with installed in aluminum heatsink 210 x 120 x t2)
Nominal resistance (Nominal standard resistance value)	20 Ω
Resistance value allowable tolerance	± 5%
Insulation resistance	100M Ω or over at DC500V megohm (between conductive part of cord and aluminum case)
Withstand voltage	AC2000V, for 1 minute (between conductive part of cord and aluminum case)
Instantaneous load tolerance	580J [The amount of energy that resistor can consume for 1 minute (only once).]
Accessory	Terminal box Model No. FK-MC0,5/2-ST2,5 (PHONENIX CONTACT GmbH & Co. KG)

Standard model DC input Driver (Model number : F5PAE140P100) + Standard motor

Basic step angle : 0.72° Rated current : 28mm sq. (1.10inch sq.) Motor 0.75A/phase, 42mm sq. (1.65inch sq.) to ϕ86mm (ϕ3.39inch) Motor 1.4A/phase

Motor size		28mm sq. (1.10inch sq.)		42mm sq. (1.65inch sq.)	
Motor length		32mm (1.26inch)	51.5mm (2.03inch)	34mm (1.34inch)	40mm (1.57inch)
Single shaft	Set ordering model no.	FAF521S	FAF525S	FAF551S	FAF552S
	Corresponding motor model number	SH5281-7241	SH5285-7241	103F5505-8241	103F5508-8241
Double shaft	Set ordering model no.	FAF521D	FAF525D	FAF551D	FAF552D
	Corresponding motor model number	SH5281-7211	SH5285-7211	103F5505-8211	103F5508-8211
Holding torque	N · m (OZ · in)	0.041 (5.81)	0.078 (11.05)	0.13 (18.41)	0.18 (25.49)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	0.01 (0.05)	0.022 (0.09)	0.03 (0.16)	0.053 (0.29)
Motor mass (Note1)	kg (lbs)	0.11 (0.22)	0.2 (0.44)	0.23 (0.50)	0.28 (0.62)
Allowable thrust load	N (lbs)	3 (0.68)	3 (0.68)	10 (2.25)	10 (2.25)
Allowable radial load (Note2)	N (lbs)	47 (10.57)	53 (11.91)	35 (8.75)	35 (8.75)

(Note1) Driver mass ▶ P.54
(Note2) When load is applied at 1/3 length from output shaft edge.

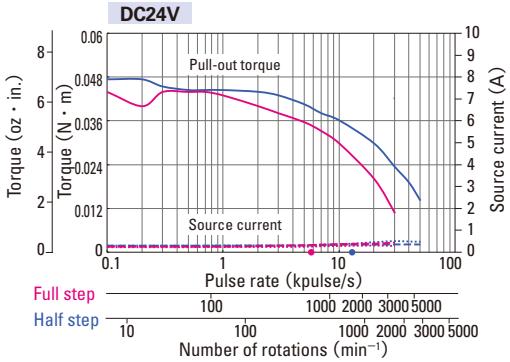
Characteristics

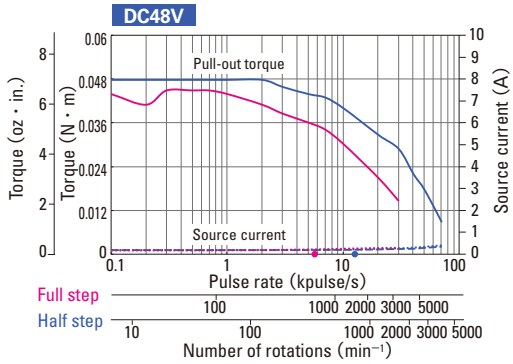
Use the rubber coupling

Allowable torque Full step —— Half step ——
Source current (no load) Full step - - - Half step - - -
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

FAF521S FAF521D

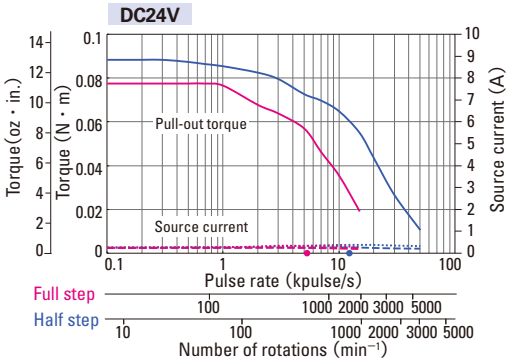
Operating current : 0.75A/phase

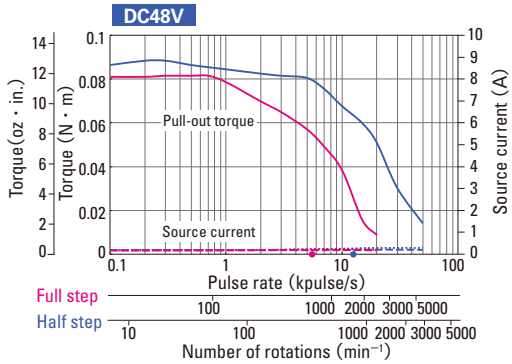




FAF525S FAF525D

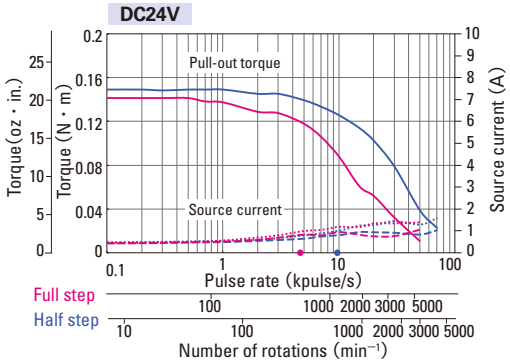
Operating current : 0.75A/phase

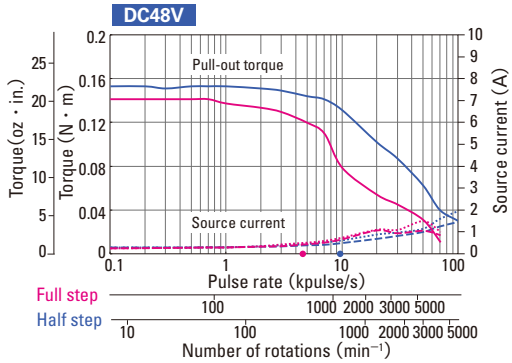




FAF551S FAF551D

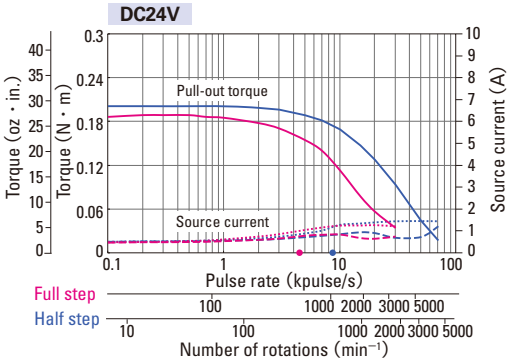
Operating current : 1.4A/phase

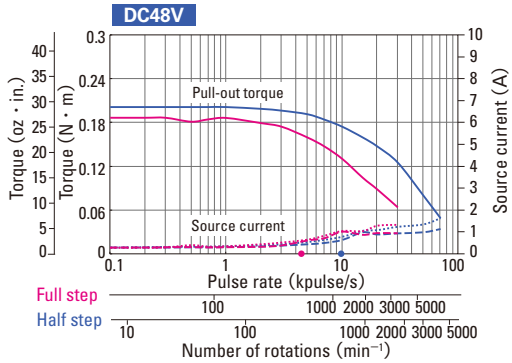




FAF552S FAF552D

Operating current : 1.4A/phase





System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.97 to P.100 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size		42mm sq. (1.65inch sq.)	60mm sq. (2.36inch sq.)		
Motor length		49mm (1.93inch)	46.5mm (1.83inch)	55mm (2.17inch)	87.5mm (3.45inch)
Single shaft	Set ordering model no.	FAF554S	FAF781S	FAF782S	FAF783S
	Corresponding motor model number	103F5510-8241	103F7851-8241	103F7852-8241	103F7853-8241
Double shaft	Set ordering model no.	FAF554D	FAF781D	FAF782D	FAF783D
	Corresponding motor model number	103F5510-8211	103F7851-8211	103F7852-8211	103F7853-8211
Holding torque	N · m (OZ · in)	0.25 (35.4)	0.55 (77.9)	0.87 (123.2)	1.67 (236.5)
Rotor inertia	X 10^{-4}kg · m² (OZ · in²)	0.065 (0.36)	0.275 (1.50)	0.4 (2.19)	0.84 (4.59)
Motor mass (Note1)	kg (lbs)	0.37 (0.81)	0.6 (1.32)	0.78 (1.72)	1.36 (3.0)
Allowable thrust load	N (lbs)	10 (2.25)	20 (4.5)	20 (4.5)	20 (4.5)
Allowable radial load (Note2)	N (lbs)	35 (8.75)	80 (18)	80 (18)	80 (18)

(Note1) Driver mass ▶ P.54
(Note2) When load is applied at 1/3 length from output shaft edge.

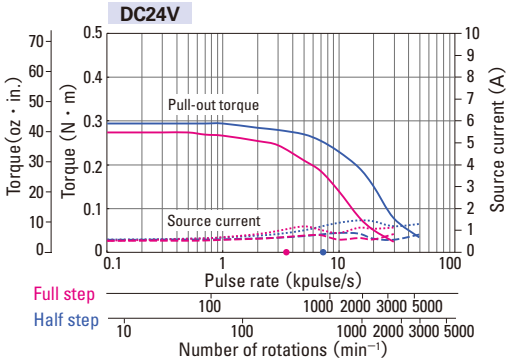
Characteristics

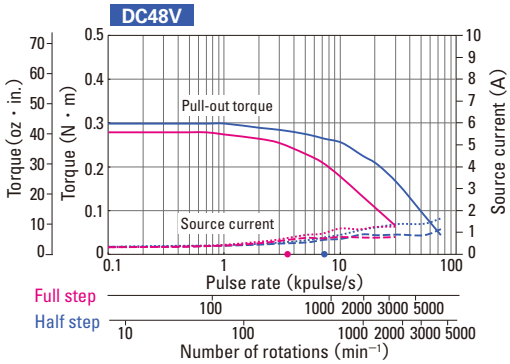
Operating current : 1.4A/phase
Use the rubber coupling

Pull-out torque Full step ——— Half step ———
Source current (no load) Full step - - - Half step - - -

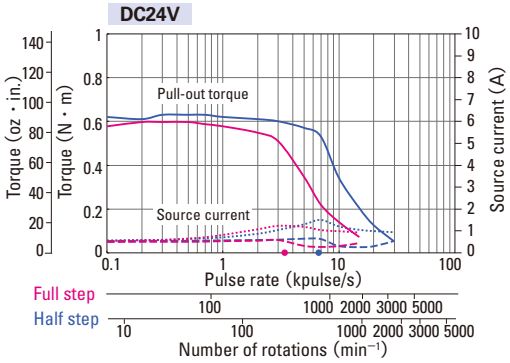
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

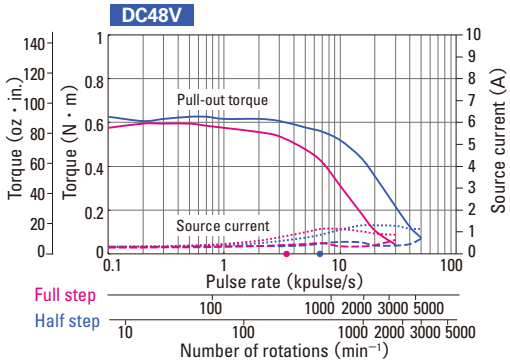
FAF554S FAF554D



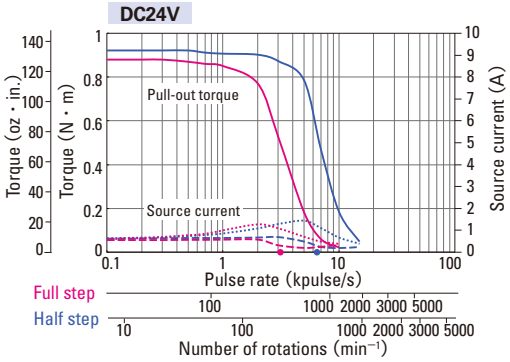


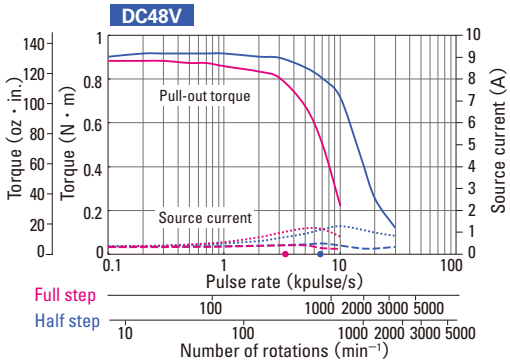
FAF781S FAF781D



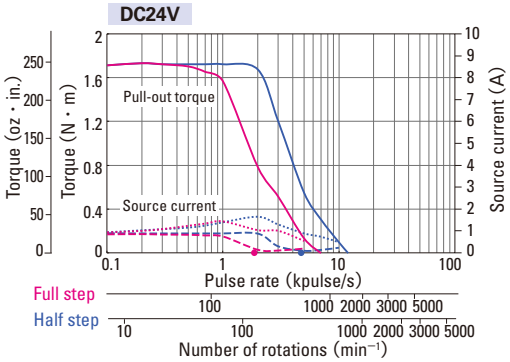


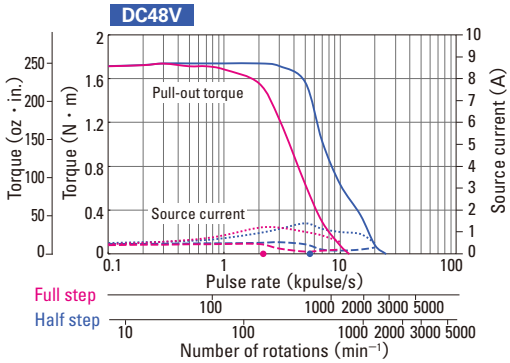
FAF782S FAF782D





FAF783S FAF783D





System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.97 to P.100 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Standard model DC input Driver (Model number : F5PAE140P100) + Standard motor

Basic step angle : 0.72° Rated current : 28mm sq. (1.10inch sq.) Motor 0.75A/phase, 42mm sq.(1.65inch sq.) to ϕ86mm(ϕ3.39inch) Motor 1.4A/phase

Motor size			ϕ86mm (ϕ3.39inch)	
Motor length			62.15mm (2.47inch)	92.2mm (3.63inch)
Single shaft	Set ordering model no.		FAF851S	FAF852S
	Corresponding motor model number		103F8581-8241	103F8582-8241
Double shaft	Set ordering model no.		FAF851D	FAF852D
	Corresponding motor model number		103F8581-8211	103F8582-8211
Holding torque		N · m (OZ · in)	2 (283.2)	4.02 (569.3)
Rotor inertia		X 10^{-4}kg · m^2 (OZ · in^2)	1.45 (7.93)	2.9 (15.86)
Motor mass (Note1)		kg (lbs)	1.5 (3.3)	2.5 (5.5)
Allowable thrust load		N (lbs)	60 (13.5)	60 (13.5)
Allowable radial load (Note2)		N (lbs)	220 (49.5)	220 (49.5)

(Note1) Driver mass ▶ P.54
(Note2) When load is applied at 1/3 length from output shaft edge.

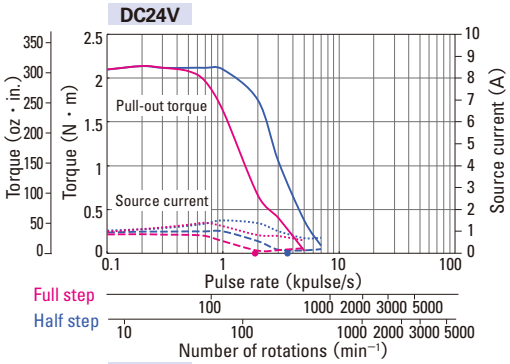
Characteristics

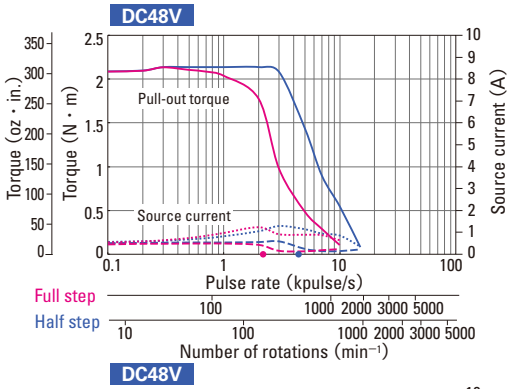
Operating current : 1.4A/phase
Use the rubber coupling

Pull-out torque Full step Half step
Source current (no load) Full step Half step

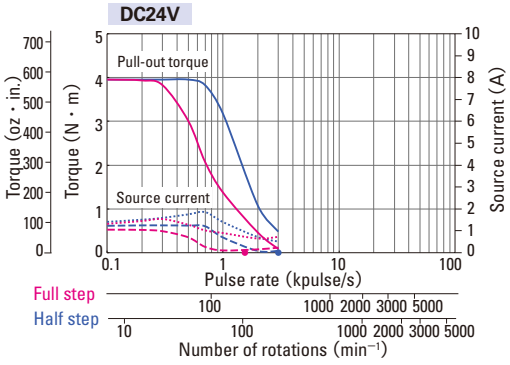
fs : Maximum self-start frequency when not loaded Full step Half step
Source current (load applied) Full step Half step

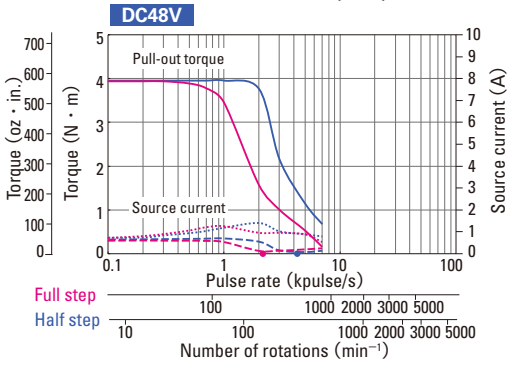
FAF851S FAF851D





FAF852S FAF852D





 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Low-backlash gear model DC input Driver (Model number : F5PAE140P100) + Motor with low-backlash gear

Rated current : 1.4A/phase

Motor size		42mm sq. (1.65inch sq.)			
Motor + gear length		64.5mm (2.54inch)	64.5mm (2.54inch)	64.5mm (2.54inch)	64.5mm (2.54inch)
Single shaft	Set ordering model no.	FAF551S-CX3.6	FAF551S-CX7.2	FAF551S-CX10	FAF551S-CX20
	Corresponding motor model number	103F5505-82CXA4	103F5505-82CXB4	103F5505-82CXE4	103F5505-82CXG4
Double shaft	Set ordering model no.	FAF551D-CX3.6	FAF551D-CX7.2	FAF551D-CX10	FAF551D-CX20
	Corresponding motor model number	103F5505-82CXA1	103F5505-82CXB1	103F5505-82CXE1	103F5505-82CXG1
Allowable torque	N · m (OZ · in)	0.343 (48.6)	0.686 (97.1)	0.98 (138.8)	1.47 (208.2)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)
Basic step angle	DEG	0.2	0.1	0.072	0.036
Gear ratio	-	1 : 3.6	1 : 7.2	1 : 10	1 : 20
Backlash	DEG	0.6	0.4	0.35	0.25
Allowable speed	min^{-1}	500	250	180	90
Motor mass (Note1)	kg (lbs)	0.36 (0.79)	0.36 (0.79)	0.36 (0.79)	0.36 (0.79)
Allowable thrust load	N (lbs)	15 (3.38)	15 (3.38)	15 (3.38)	15 (3.38)
Allowable radial load (Note2)	N (lbs)	20 (4.5)	20 (4.5)	20 (4.5)	20 (4.5)

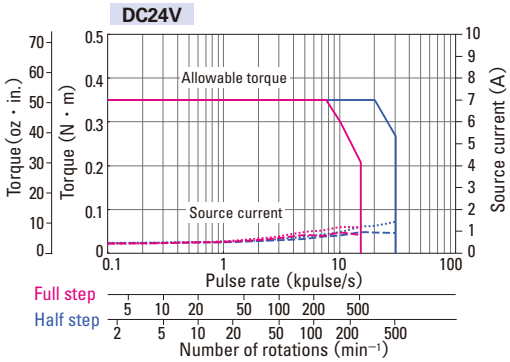
Directions of motor rotation and gear output shaft are the same for models with reduction ratio 1 : 3.6, 1 : 7.2 and 1 : 10 opposite for reduction ratio 1 : 20, 1 : 30, and 1 : 36.
(Note1) Driver mass ▶ P.54
(Note2) When load is applied at 1/3 length from output shaft edge.

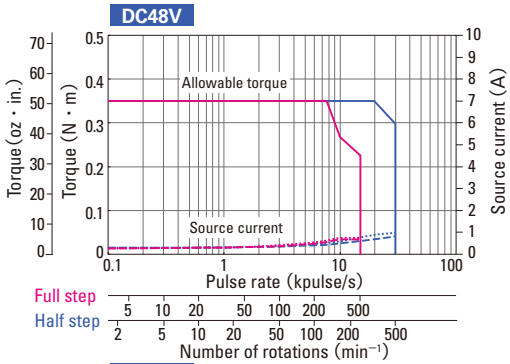
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

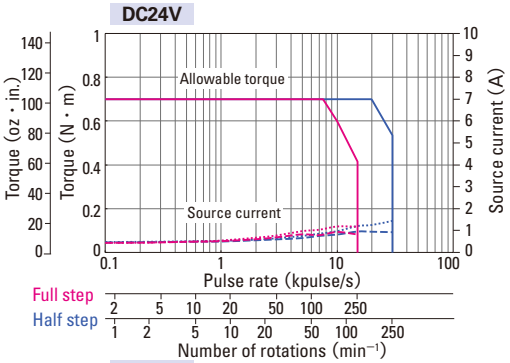
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

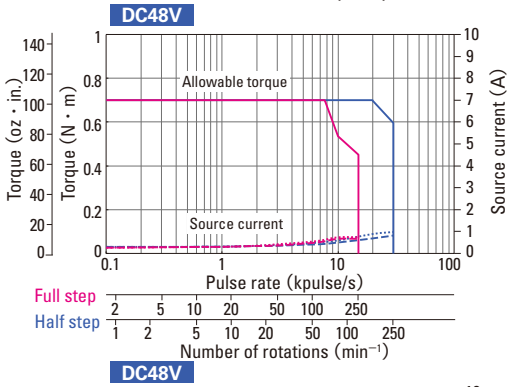
FAF551S-CX3.6 FAF551D-CX3.6



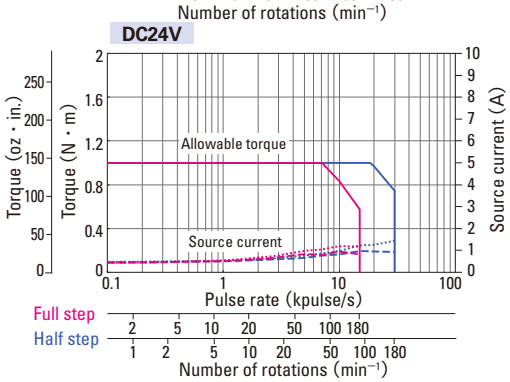


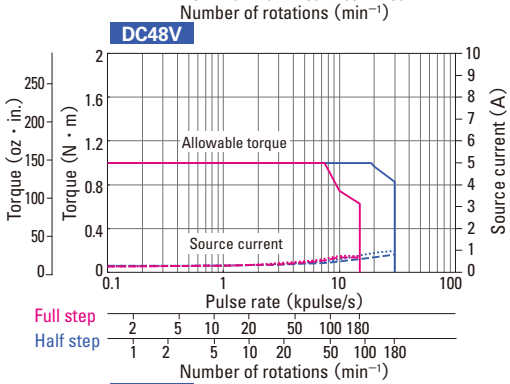
FAF551S-CX7.2 FAF551D-CX7.2



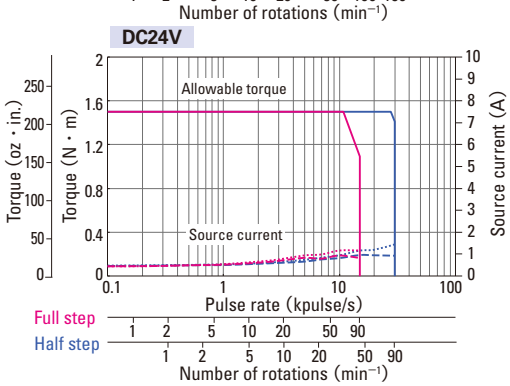


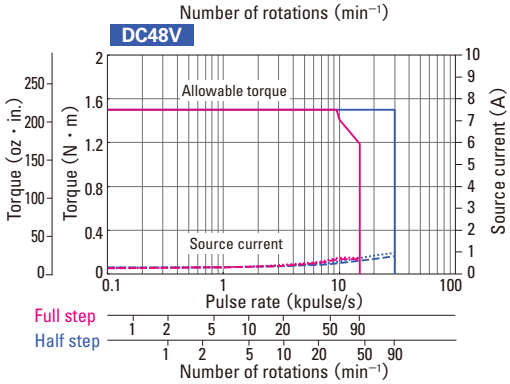
FAF551S-CX10 FAF551D-CX10





FAF551S-CX20 FAF551D-CX20





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Low-backlash gear model DC input Driver (Model number : F5PAE140P100) + Motor with low-backlash gear

Rated current : 1.4A/phase

Motor size		42mm sq. (1.65inch sq.)		60mm sq. (2.36inch sq.)	
Motor + gear length		64.5mm (2.54inch)	64.5mm (2.54inch)	92mm (3.62inch)	92mm (3.62inch)
Single shaft	Set ordering model no.	FAF551S-CX30	FAF551S-CX36	FAF781S-CX3.6	FAF781S-CX7.2
	Corresponding motor model number	103F5505-82CXJ4	103F5505-82CXK4	103F7851-82CXA4	103F7851-82CXB4
Double shaft	Set ordering model no.	FAF551D-CX30	FAF551D-CX36	FAF781D-CX3.6	FAF781D-CX7.2
	Corresponding motor model number	103F5505-82CXJ1	103F5505-82CXK1	103F7851-82CXA1	103F7851-82CXB1
Allowable torque	N · m (OZ · in)	1.47 (208.2)	1.47 (208.2)	1.25 (177.0)	2.5 (354.0)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	0.03 (0.16)	0.03 (0.16)	0.275 (1.5)	0.275 (1.5)
Basic step angle	DEG	0.024	0.02	0.2	0.1
Gear ratio	-	1 : 30	1 : 36	1 : 3.6	1 : 7.2
Backlash	DEG	0.25	0.25	0.55	0.25
Allowable speed	min^{-1}	60	50	500	250
Motor mass (Note1)	kg (lbs)	0.36 (0.79)	0.36 (0.79)	0.97 (2.13)	0.97 (2.13)
Allowable thrust load	N (lbs)	15 (3.38)	15 (3.38)	30 (6.75)	30 (6.75)
Allowable radial load (Note2)	N (lbs)	20 (4.5)	20 (4.5)	100 (22.5)	100 (22.5)

The directions of motor rotation and gear output axle rotation for 42 mm models are the same for 1:3.6, 1:7.2 and 1:10 reduction ratios, and opposite for 1:20, 1:30 and 1:36 reduction ratios. For 60 mm models, rotation directions are the same for 1:3.6 and 1:7.2 reduction ratios, and opposite for 1:10, 1:20, 1:30 and 1:36 reduction ratios.

(Note1) Driver mass ▶ P.54

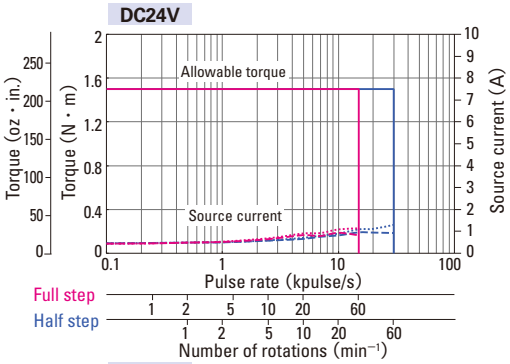
(Note2) When load is applied at 1/3 length from output shaft edge.

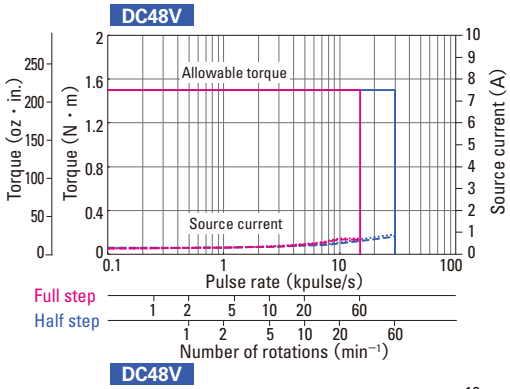
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

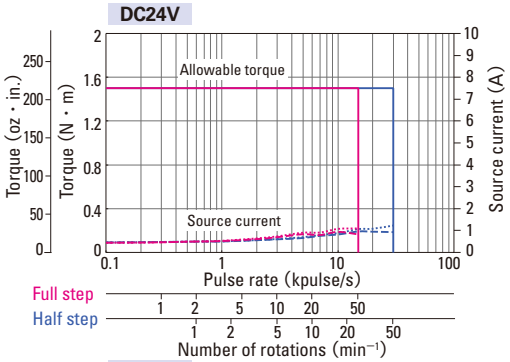
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

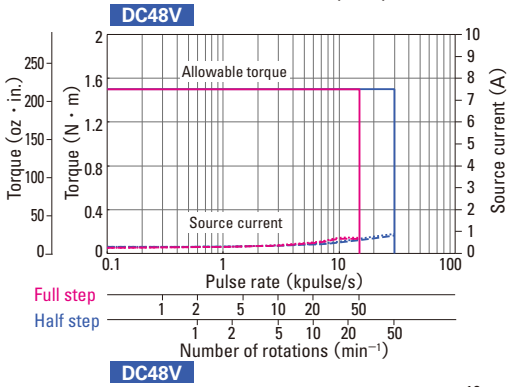
FAF551S-CX30 FAF551D-CX30



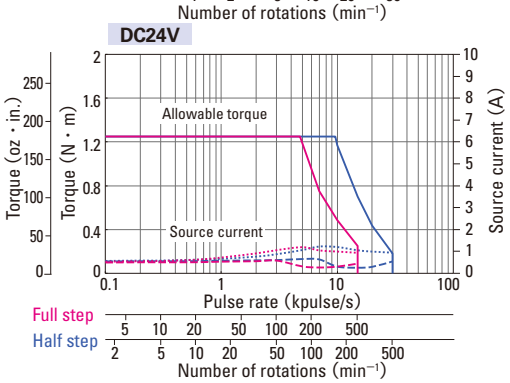


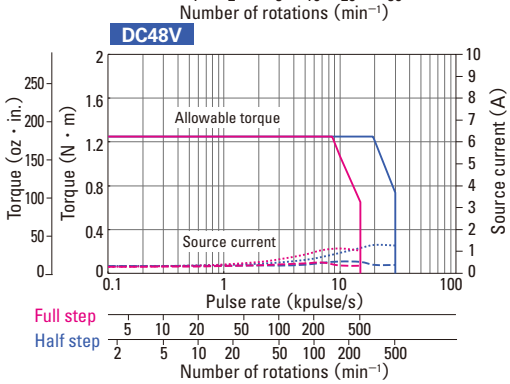
FAF551S-CX36 FAF551D-CX36



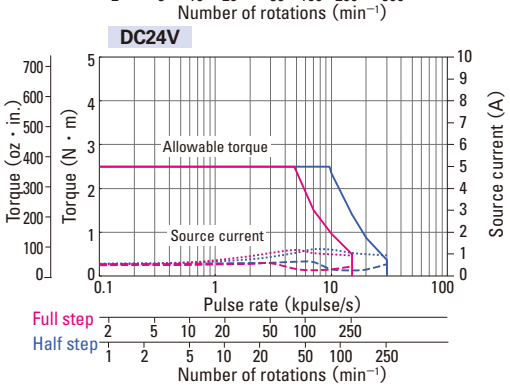


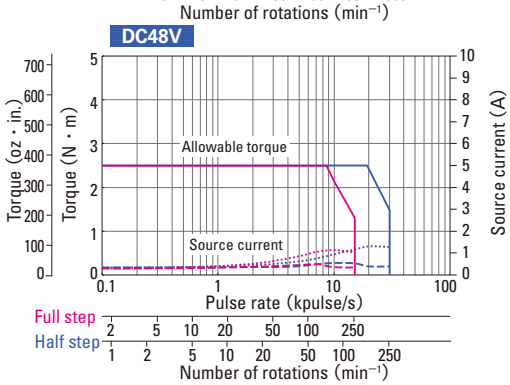
FAF781S-CX3.6 FAF781D-CX3.6





FAF781S-CX7.2 FAF781D-CX7.2





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.

System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size		60mm sq. (2.36inch sq.)			
Motor + gear length		92mm (3.62inch)	92mm (3.62inch)	92mm (3.62inch)	92mm (3.62inch)
Single shaft	Set ordering model no.	FAF781S-CX10	FAF781S-CX20	FAF781S-CX30	FAF781S-CX36
	Corresponding motor model number	103F7851-82CXE4	103F7851-82CXG4	103F7851-82CXJ4	103F7851-82CXK4
Double shaft	Set ordering model no.	FAF781D-CX10	FAF781D-CX20	FAF781D-CX30	FAF781D-CX36
	Corresponding motor model number	103F7851-82CXE1	103F7851-82CXG1	103F7851-82CXJ1	103F7851-82CXK1
Allowable torque	N · m (OZ · in)	3 (424.8)	3.5 (495.6)	4 (566.4)	4 (566.4)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	0.275 (1.5)	0.275 (1.5)	0.275 (1.5)	0.275 (1.5)
Basic step angle	DEG	0.072	0.036	0.024	0.02
Gear ratio	-	1 : 10	1 : 20	1 : 30	1 : 36
Backlash	DEG	0.25	0.17	0.17	0.17
Allowable speed	min^{-1}	180	90	60	50
Motor mass (Note1)	kg (lbs)	0.97 (2.13)	0.97 (2.13)	0.97 (2.13)	0.97 (2.13)
Allowable thrust load	N (lbs)	30 (6.75)	30 (6.75)	30 (6.75)	30 (6.75)
Allowable radial load (Note2)	N (lbs)	100 (22.5)	100 (22.5)	100 (22.5)	100 (22.5)

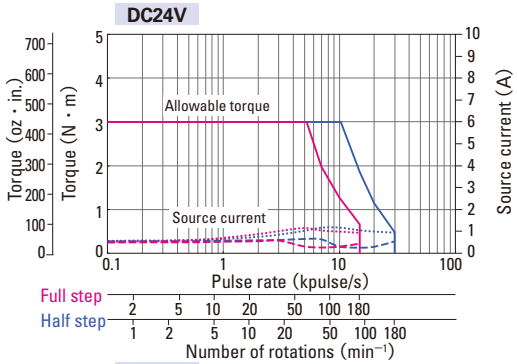
The directions of motor rotation and gear output axle rotation are the same for models with reduction ratio 1:3.6 and 1:7.2 reduction ratios, and opposite for 1:10, 1:20, 1:30 and 1:36 reduction ratios.
(Note1) Driver mass ▶ P.54
(Note2) When load is applied at 1/3 length from output shaft edge.

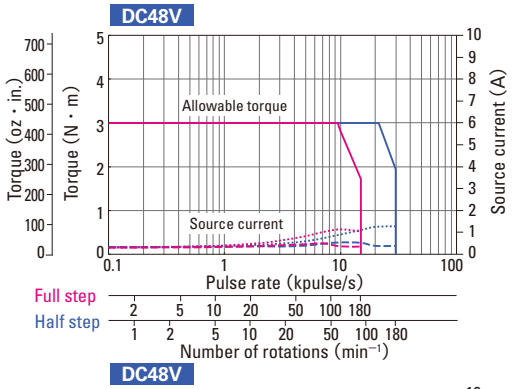
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

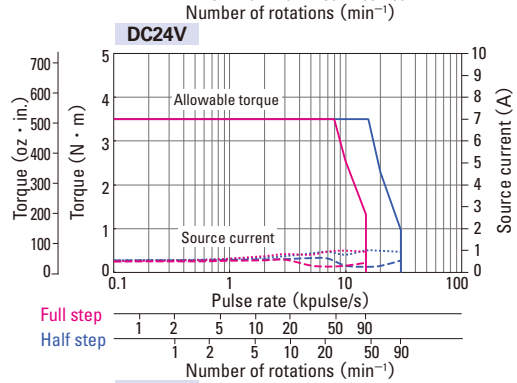
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

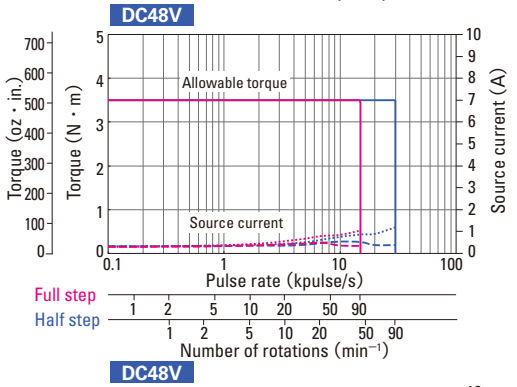
FAF781S-CX10 FAF781D-CX10



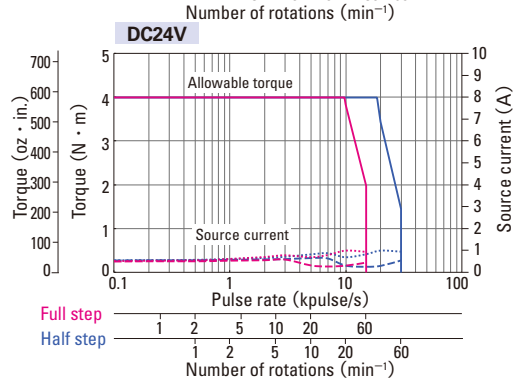


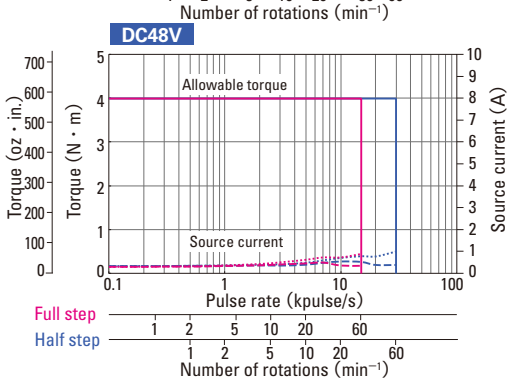
FAF781S-CX20 FAF781D-CX20



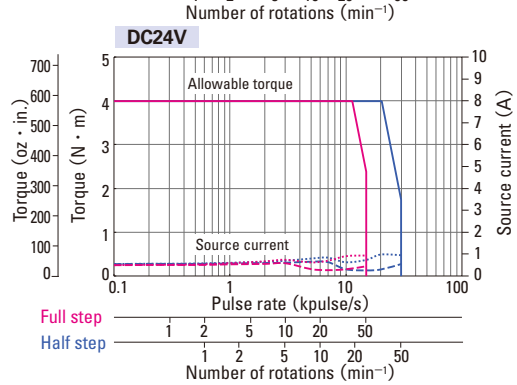


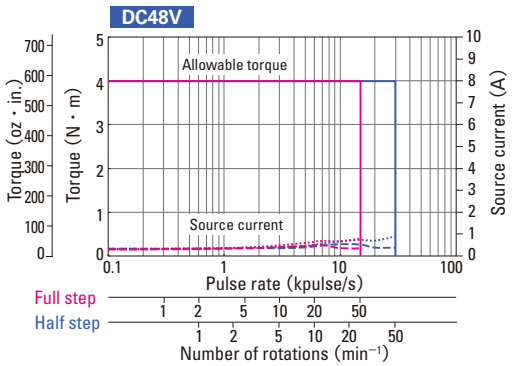
FAF781S-CX30 FAF781D-CX30





FAF781S-CX36 FAF781D-CX36





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Low-backlash gear model DC input Driver (Model number : F5PAE140P100) + Motor with low-backlash gear

Rated current : 1.4A/phase

Motor size			⌀86mm (⌀3.39inch)			
Motor + gear length			127.3mm (5.01inch)	127.3mm (5.01inch)	127.3mm (5.01inch)	127.3mm (5.01inch)
Single shaft	Set ordering model no.		FAF851S-CX3.6	FAF851S-CX7.2	FAF851S-CX10	FAF851S-CX20
	Corresponding motor model number		103F8581-82CXA4	103F8581-82CXB4	103F8581-82CXE4	103F8581-82CXG4
Double shaft	Set ordering model no.		FAF851D-CX3.6	FAF851D-CX7.2	FAF851D-CX10	FAF851D-CX20
	Corresponding motor model number		103F8581-82CXA1	103F8581-82CXB1	103F8581-82CXE1	103F8581-82CXG1
Allowable torque		N · m (OZ · in)	4.5 (637.2)	9 (1274.5)	9 (1274.5)	12 (1699.3)
Rotor inertia		X 10^{-4}kg · m² (OZ · in²)	1.45 (7.93)	1.45 (7.93)	1.45 (7.93)	1.45 (7.93)
Basic step angle		DEG	0.2	0.1	0.072	0.036
Gear ratio		-	1 : 3.6	1 : 7.2	1 : 10	1 : 20
Backlash		DEG	0.35	0.22	0.22	0.15
Allowable speed		min^{-1}	500	250	180	90
Motor mass (Note1)		kg (lbs)	2.7 (5.94)	2.7 (5.94)	2.7 (5.94)	2.7 (5.94)
Allowable thrust load		N (lbs)	60 (13.5)	60 (13.5)	60 (13.5)	60 (13.5)
Allowable radial load (Note2)		N (lbs)	300 (67.5)	300 (67.5)	300 (67.5)	300 (67.5)

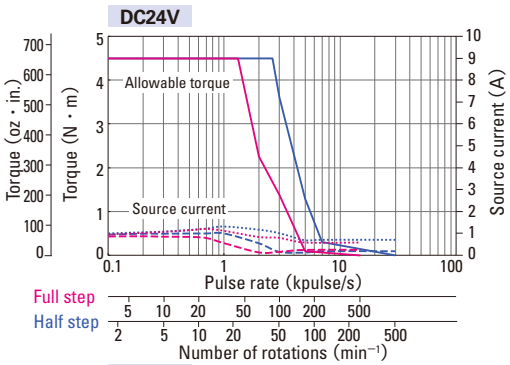
The directions of motor rotation and gear output axle rotation are the same for models with reduction ratio 1:3.6 and 1:7.2 reduction ratios, and opposite for 1:10, 1:20, 1:30 and 1:36 reduction ratios.
(Note1) Driver mass ▶ P.54
(Note2) When load is applied at 1/3 length from output shaft edge.

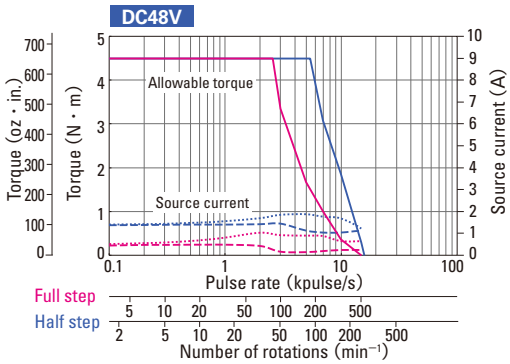
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

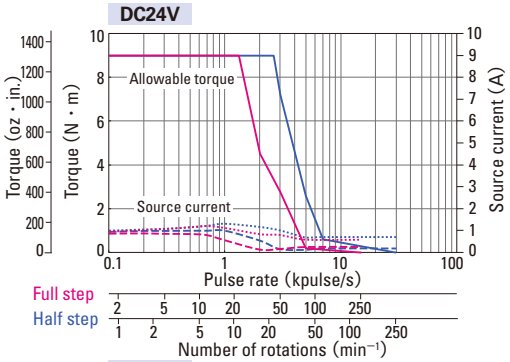
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

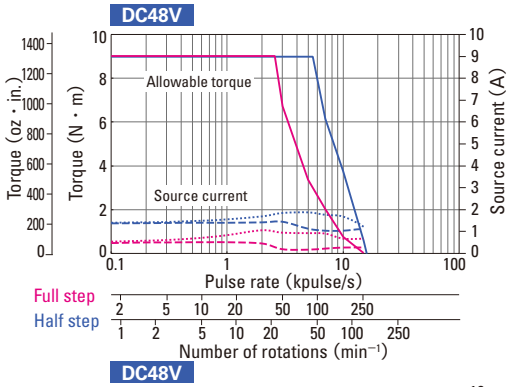
FAF851S-CX3.6 FAF851D-CX3.6



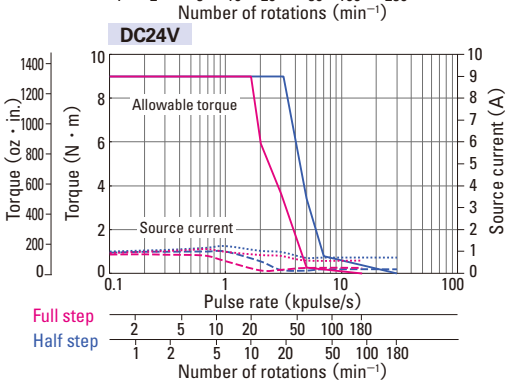


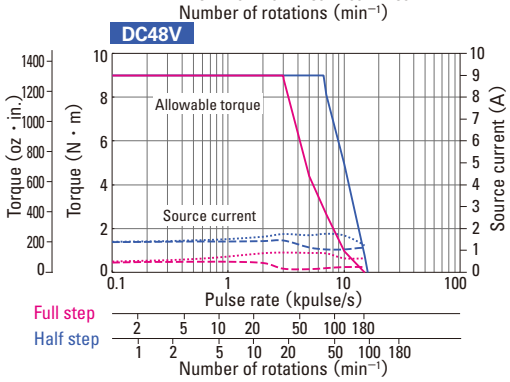
FAF851S-CX7.2 FAF851D-CX7.2



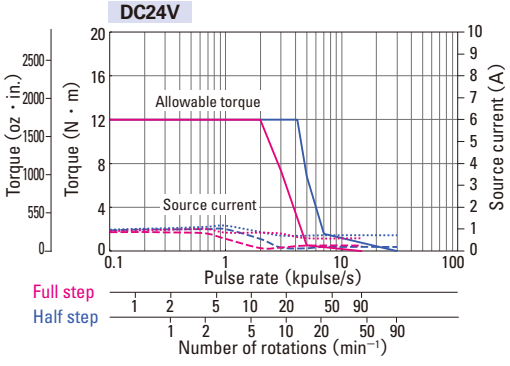


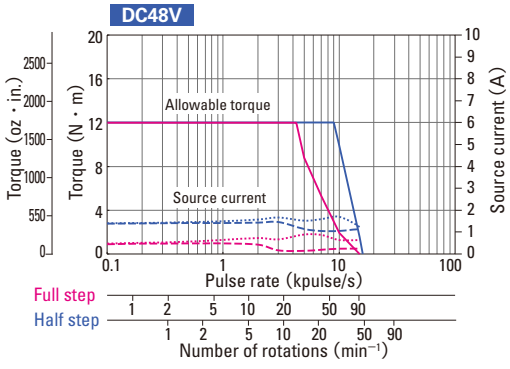
FAF851S-CX10 FAF851D-CX10





FAF851S-CX20 FAF851D-CX20





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size		ϕ86mm (ϕ3.39inch)	
Motor + gear length		127.3mm (5.01inch)	127.3mm (5.01inch)
Single shaft	Set ordering model no.	FAF851S-CX30	FAF851S-CX36
	Corresponding motor model number	103F8581-82CXJ4	103F8581-82CXK4
Double shaft	Set ordering model no.	FAF851D-CX30	FAF851D-CX36
	Corresponding motor model number	103F8581-82CXJ1	103F8581-82CXK1
Allowable torque	N · m (OZ · in)	12 (1699.3)	12 (1699.3)
Rotor inertia	X 10^{-4}kg · m² (OZ · in²)	1.45 (7.93)	1.45 (7.93)
Basic step angle	DEG	0.024	0.02
Gear ratio	-	1 : 30	1 : 36
Backlash	DEG	0.15	0.15
Allowable speed	min^{-1}	60	50
Motor mass (Note1)	kg (lbs)	2.7 (5.94)	2.7 (5.94)
Allowable thrust load	N (lbs)	60 (13.5)	60 (13.5)
Allowable radial load (Note2)	N (lbs)	300 (67.5)	300 (67.5)

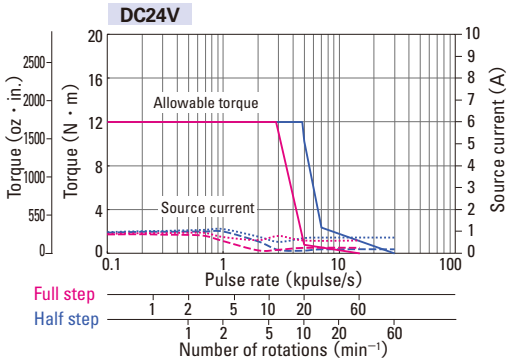
The directions of motor rotation and gear output axle rotation are the same for models with reduction ratio 1:3.6 and 1:7.2 reduction ratios, and opposite for 1:10, 1:20, 1:30 and 1:36 reduction ratios.
(Note1) Driver mass ▶ P.54
(Note2) When load is applied at 1/3 length from output shaft edge.

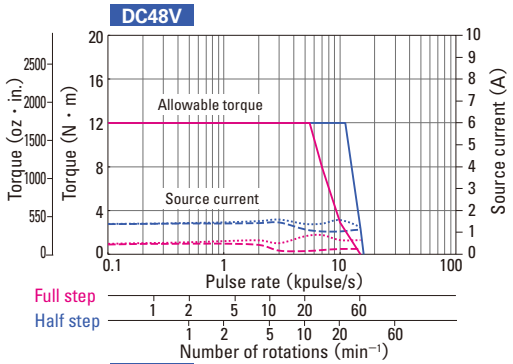
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

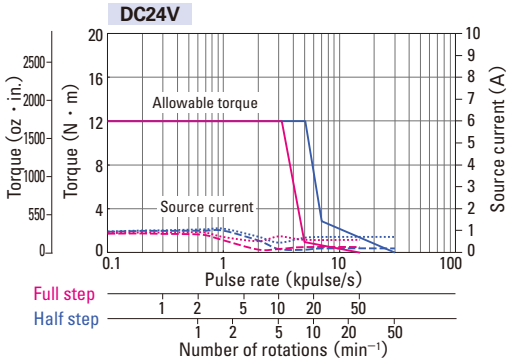
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

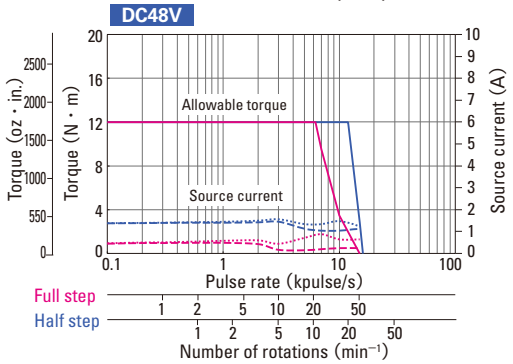
FAF851S-CX30 FAF851D-CX30





FAF851S-CX36 FAF851D-CX36





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Spur gear model DC input Driver (Model number : F5PAE140P100) + Motor with spur gear

Rated current : 0.75A/phase

Motor size		28mm sq. (1.10inch sq.)			
Motor + gear length		61.5mm (2.42inch)	61.5mm (2.42inch)	61.5mm (2.42inch)	61.5mm (2.42inch)
Single shaft	Set ordering model no.	FAF521S-GX3.6	FAF521S-GX7.2	FAF521S-GX10	FAF521S-GX20
	Corresponding motor model number	SH5281-72GXA4	SH5281-72GXB4	SH5281-72GXE4	SH5281-72GXG4
Double shaft	Set ordering model no.	FAF521D-GX3.6	FAF521D-GX7.2	FAF521D-GX10	FAF521D-GX20
	Corresponding motor model number	SH5281-72GXA1	SH5281-72GXB1	SH5281-72GXE1	SH5281-72GXG1
Allowable torque	N · m (OZ · in)	0.1 (14.16)	0.15 (21.24)	0.2 (28.32)	0.35 (49.6)
Rotor inertia	X 10⁻⁴kg · m² (OZ · in²)	0.01 (0.05)	0.01 (0.05)	0.01 (0.05)	0.01 (0.05)
Basic step angle	DEG	0.2	0.1	0.072	0.036
Gear ratio	-	1 : 3.6	1 : 7.2	1 : 10	1 : 20
Backlash	DEG	2	2	2	1.5
Allowable speed	min⁻¹	800	400	300	150
Motor mass (Note1)	kg (lbs)	0.17 (0.37)	0.17 (0.37)	0.17 (0.37)	0.17 (0.37)
Allowable thrust load	N (lbs)	10 (2.25)	10 (2.25)	10 (2.25)	10 (2.25)
Allowable radial load (Note2)	N (lbs)	15 (3.38)	15 (3.38)	15 (3.38)	15 (3.38)

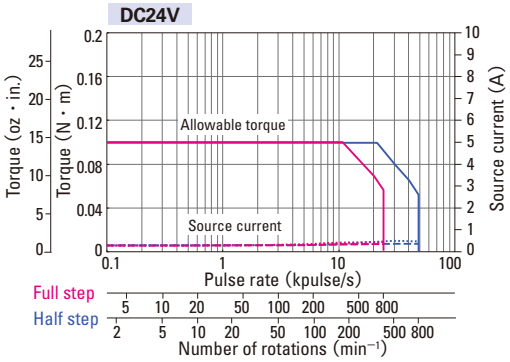
The directions of motor rotation and gear output axle rotation are the same for models with reduction ratio 1:3.6, 1:7.2, 1:20, 1:30 and 1:50 reduction ratios, and opposite for 1:10 reduction ratios.
(Note1) Driver mass ▶ P.54
(Note2) When load is applied at 1/3 length from output shaft edge.

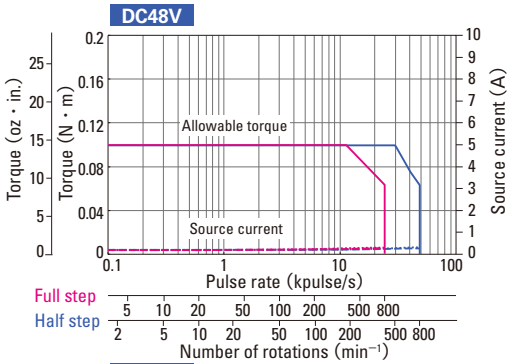
Characteristics

Operating current : 0.75A/phase
Use the rubber coupling

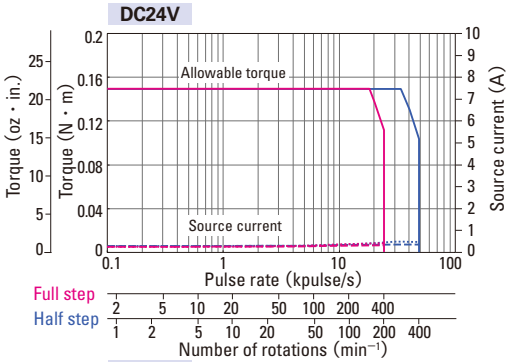
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

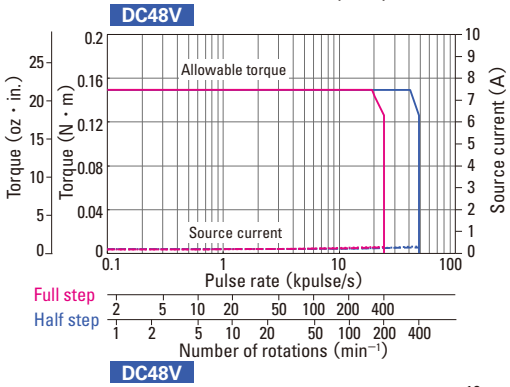
FAF521S-GX3.6 FAF521D-GX3.6



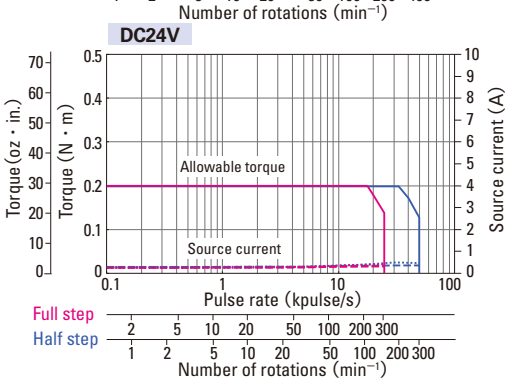


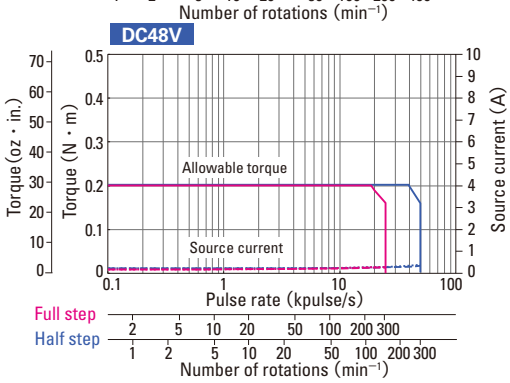
FAF521S-GX7.2 FAF521D-GX7.2



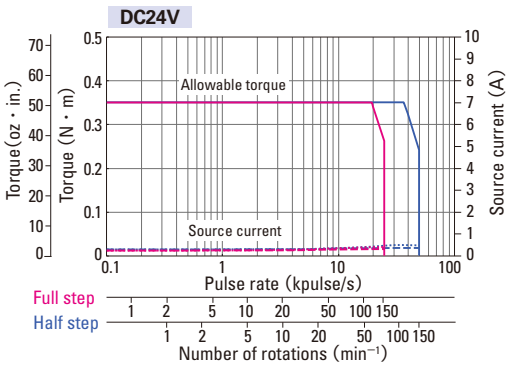


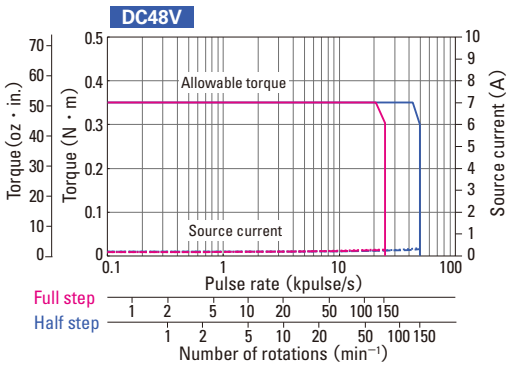
FAF521S-GX10 FAF521D-GX10





FAF521S-GX20 FAF521D-GX20





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.102 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size		28mm sq. (1.10inch sq.)	
Motor + gear length		61.5mm (2.42inch)	61.5mm (2.42inch)
Single shaft	Set ordering model no.	FAF521S-GX30	FAF521S-GX50
	Corresponding motor model number	SH5281-72GXJ4	SH5281-72GXL4
Double shaft	Set ordering model no.	FAF521D-GX30	FAF521D-GX50
	Corresponding motor model number	SH5281-72GXJ1	SH5281-72GXL1
Allowable torque	N · m (OZ · in)	0.5 (70.80)	0.5 (70.80)
Rotor inertia	X 10^{-4}kg · m² (OZ · in²)	0.01 (0.05)	0.01 (0.05)
Basic step angle	DEG	0.024	0.0144
Gear ratio	-	1 : 30	1 : 50
Backlash	DEG	1.5	1.5
Allowable speed	min^{-1}	100	60
Motor mass (Note1)	kg (lbs)	0.17 (0.37)	0.17 (0.37)
Allowable thrust load	N (lbs)	10 (2.25)	10 (2.25)
Allowable radial load (Note2)	N (lbs)	15 (3.38)	15 (3.38)

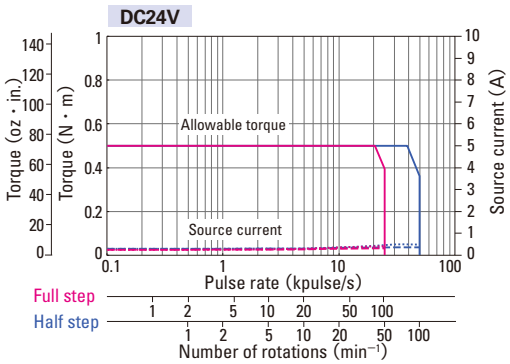
The directions of motor rotation and gear output axle rotation are the same for models with reduction ratio 1:3.6, 1:7.2, 1:20, 1:30 and 1:50 reduction ratios, and opposite for 1:10 reduction ratios.
(Note1) Driver mass ▶ P.54
(Note2) When load is applied at 1/3 length from output shaft edge.

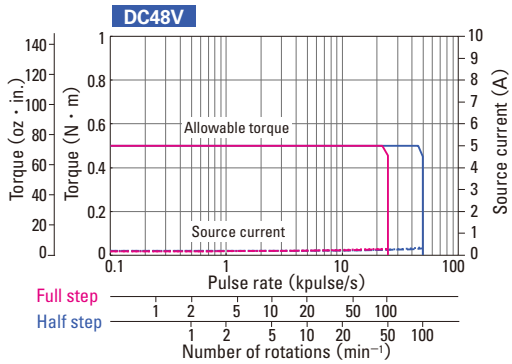
Characteristics

Operating current : 0.75A/phase
Use the rubber coupling

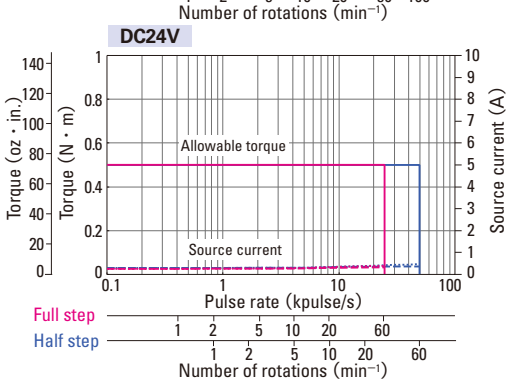
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

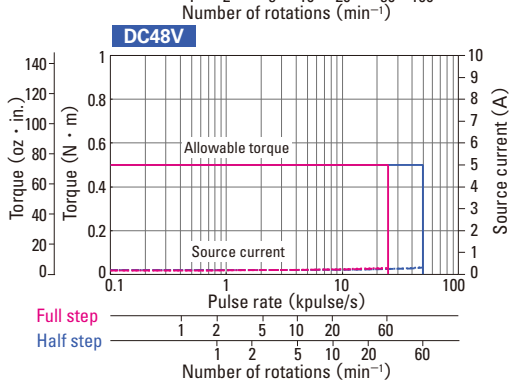
FAF521S-GX30
FAF521D-GX30





FAF521S-GX50
FAF521D-GX50





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.102 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Harmonic gear model DC input Driver (Model number : F5PAE140P100) + Harmonic gear motor

Rated current : 28mm sq. (1.10inch sq.) Motor 0.75A/phase, 42mm sq. (1.65inch sq.) to ϕ86mm(ϕ3.39inch) Motor 1.4A/phase

Motor size			28mm sq. (1.10inch sq.)		42mm sq. (1.65inch sq.)	
Motor + gear length			70.7mm (2.78inch)	70.7mm (2.78inch)	73.5 mm (2.89inch)	73.5 mm (2.89inch)
Single shaft	Set ordering model no.		FAF521S-HX50	FAF521S-HX100	FAF551S-HX30	FAF551S-HX50
	Corresponding motor model number		SH5281-72HXL4	SH5281-72HXM4	103F5505-82HXJ5	103F5505-82HXL5
Double shaft	Set ordering model no.		FAF521D-HX50	FAF521D-HX100	FAF551D-HX30	FAF551D-HX50
	Corresponding motor model number		SH5281-72HXL1	SH5281-72HXM1	103F5505-82HXJ2	103F5505-82HXL2
Allowable torque		N · m (OZ · in)	1.5 (212.4)	2 (283.2)	2.2 (311.547)	3.5 (495.643)
Momentary allowable torque		N · m (OZ · in)	2.6 (368.2)	3.6 (509.8)	4.5 (637.3)	8.3 (1175.4)
Rotor inertia		X 10^{-4}kg · m^2 (OZ · in^2)	0.013 (0.066)	0.013 (0.066)	0.042 (0.23)	0.042 (0.23)
Basic step angle		DEG	0.0144	0.0072	0.024	0.0144
Gear ratio		-	1 : 50	1 : 100	1 : 30	1 : 50
Hysteresis loss		Minute	-	-	3.6	2.4
Lost motion		Minute	0.4 to 3 (± 0.06N · m) (0.85oz · in)	0.4 to 3 (± 0.08N · m) (1.133oz · in)	-	-
Allowable speed		min^{-1}	70	35	116	70
Motor mass (Note1)		kg (lbs)	0.22 (0.48)	0.22 (0.48)	0.43 (0.94)	0.43 (0.94)
Allowable thrust load		N (lbs)	100 (22.5)	100 (22.5)	1150 (258.75)	1150 (258.75)
Allowable radial load (Note2)		N (lbs)	160 (36)	160 (36)	275 (61.88)	275 (61.88)

Direction of gear output shaft are the opposite. (Note1) Driver mass ▶ P.54 (Note2) When load is applied at 1/3 length from shaft edge.

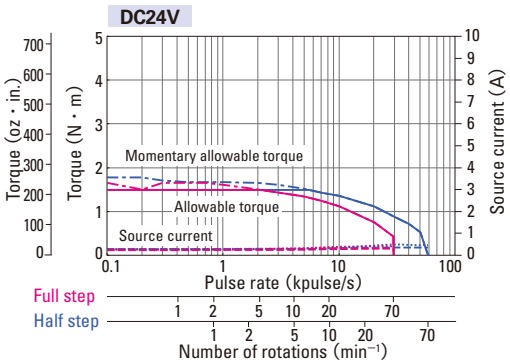
Characteristics

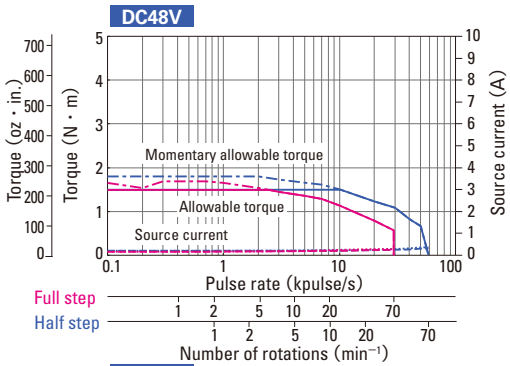
Use the rubber coupling

Momentary allowable torque Full step / Half step
Source current (load applied) Full step / Half step
Allowable torque Full step / Half step
Source current (no load) Full step / Half step

FAF521S-HX50 FAF521D-HX50

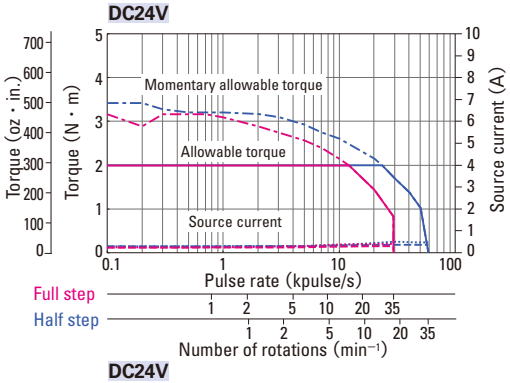
Operating current : 0.75A/phase

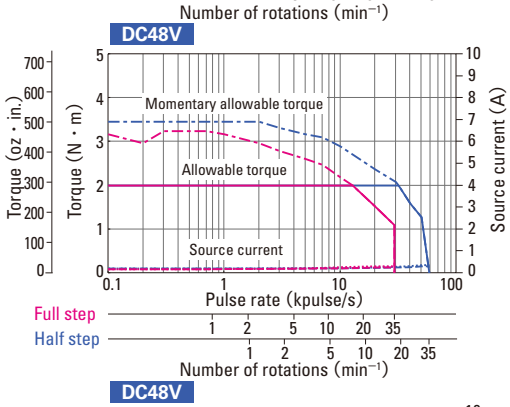




FAF521S-HX100 FAF521D-HX100

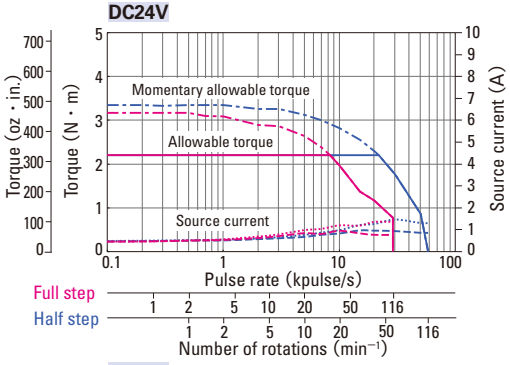
Operating current : 0.75A/phase

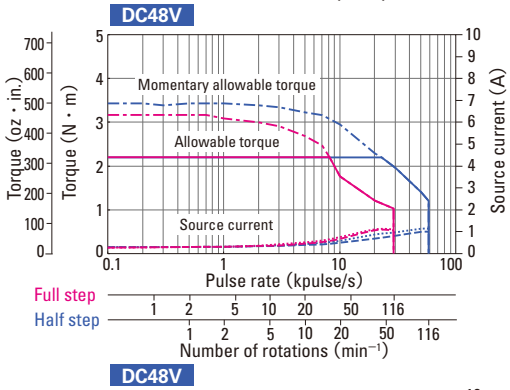




FAF551S-HX30 FAF551D-HX30

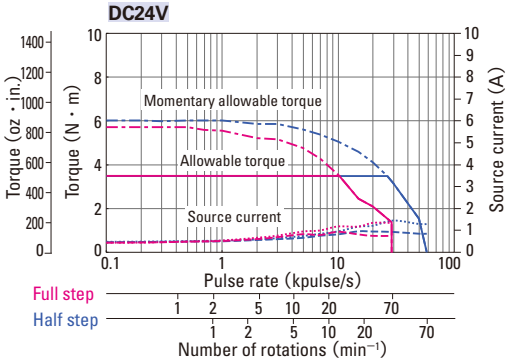
Operating current : 1.4A/phase

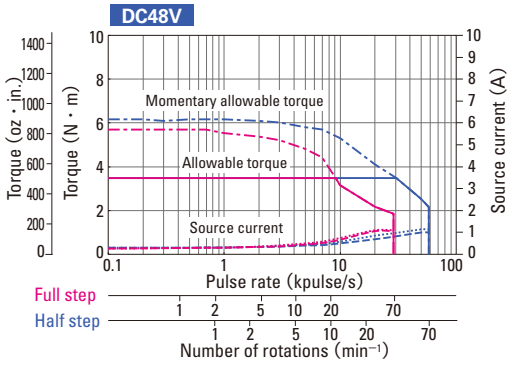




FAF551S-HX50 FAF551D-HX50

Operating current : 1.4A/phase





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its momentary allowable torque will not be exceeded.

System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.102 to 103 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size		42mm sq. (1.65inch sq.)	60mm sq. (2.36inch sq.)		ϕ86mm (ϕ3.39inch)
Motor + gear length		73.5 mm (2.89inch)	113.5mm (4.47inch)	113.5mm (4.47inch)	144.15mm (5.68inch)
Single shaft	Set ordering model no.	FAF551S-HX100	FAF781S-HX50	FAF781S-HX100	FAF851S-HX50
	Corresponding motor model number	103F5505-82HXM5	103F7851-82HXL4	103F7851-82HXM4	103F8581-82HXL4
Double shaft	Set ordering model no.	FAF551D-HX100	FAF781D-HX50	FAF781D-HX100	FAF851D-HX50
	Corresponding motor model number	103F5505-82HXM2	103F7851-82HXL1	103F7851-82HXM1	103F8581-82HXL1
Allowable torque	N · m (OZ · in)	5 (708.061)	5.5 (778.8)	8 (1132.9)	25 (3540.2)
Momentary allowable torque	N · m (OZ · in)	11 (1557.7)	14 (1982.6)	20 (2832.2)	34 (4814.8)
Rotor inertia	X 10^{-4}kg · m² (OZ · in²)	0.0042 (0.02)	0.31 (1.695)	0.31 (1.695)	1.65 (9.02)
Basic step angle	DEG	0.0072	0.0144	0.0072	0.0144
Gear ratio	-	1 : 100	1 : 50	1 : 100	1 : 50
Hysteresis loss	Minute	2.4	-	-	-
Lost motion	Minute	-	0.4 to 3 (± 0.28N · m) (3.965oz · in)	0.4 to 3 (± 0.4N · m) (56.645oz · in)	0.4 to 3 (± 1N · m) (141.612oz · in)
Allowable speed	min^{-1}	35	70	35	70
Motor mass (Note1)	kg (lbs)	0.43 (0.92)	1.2 (2.64)	1.2 (2.64)	3.3 (7.26)
Allowable thrust load	N (lbs)	1150 (258.75)	400 (90)	400 (90)	1400 (315)
Allowable radial load (Note2)	N (lbs)	275 (61.88)	360 (81)	360 (81)	1380 (310.5)

Direction of gear output shaft are the opposite. (Note1) Driver mass ▶ P.54 (Note2) When load is applied at 1/3 length from shaft edge.

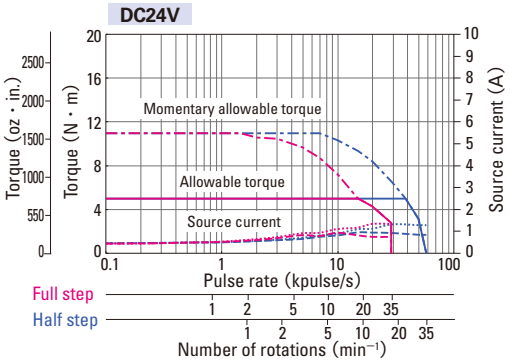
Characteristics

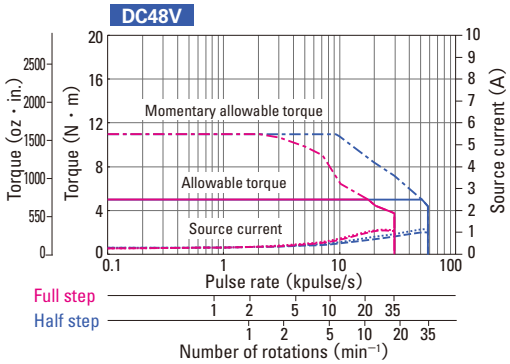
Operating current : 1.4A/phase
Use the rubber coupling

Momentary allowable torque Full step Half step
Source current (load applied) Full step Half step

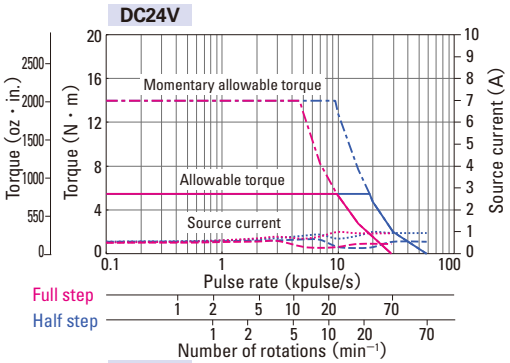
Allowable torque Full step Half step
Source current (no load) Full step Half step

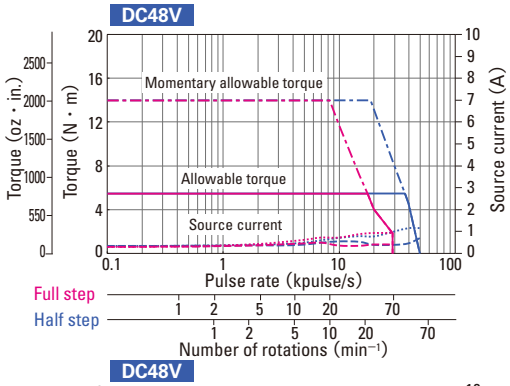
FAF551S-HX100 FAF551D-HX100



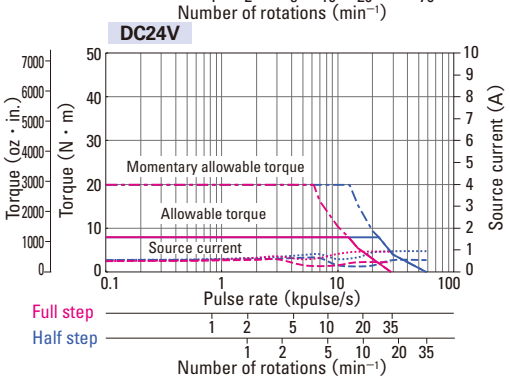


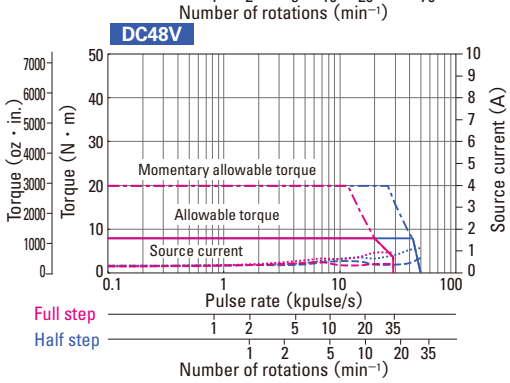
FAF781S-HX50 FAF781D-HX50



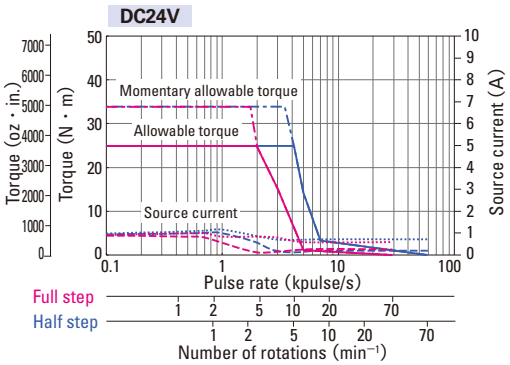


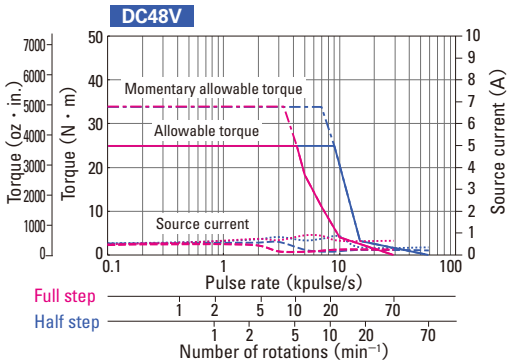
FAF781S-HX100 FAF781D-HX100





FAF851S-HX50 FAF851D-HX50





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its momentary allowable torque will not be exceeded.
System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.102 to 103 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Harmonic gear model DC input Driver (Model number : F5PAE140P100) + Harmonic gear motor

Rated current : 28mm sq. (1.10inch sq.) Motor 0.75A/phase, 42mm sq. (1.65inch sq.) to ϕ86mm(ϕ3.39inch) Motor 1.4A/phase

Motor size			**ϕ86mm (ϕ3.39inch)**
Motor + gear length			**144.15mm (5.68inch)**
Single shaft	**Set ordering model no.**		**FAF851S-HX100**
	Corresponding motor model number		103F8581-82HXM4
Double shaft	**Set ordering model no.**		**FAF851D-HX100**
	Corresponding motor model number		103F8581-82HXM1
Allowable torque		N · m (OZ · in)	41 (5805.9)
Momentary allowable torque		N · m (OZ · in)	59 (8355.1)
Rotor inertia		X 10^{-4}kg · m^2 (OZ · in^2)	1.65 (9.02)
Basic step angle		DEG	0.0072
Gear ratio		-	1 : 100
Hysteresis loss		Minute	-
Lost motion		Minute	0.4 to 3 (± 1.2N · m) (169.934oz · in)
Allowable speed		min^{-1}	35
Motor mass (Note1)		kg (lbs)	3.3 (7.26)
Allowable thrust load		N (lbs)	1400 (315)
Allowable radial load (Note2)		N (lbs)	1380 (310.5)

Direction of gear output shaft are the opposite. (Note1) Driver mass ▶ P.54 (Note2) When load is applied at 1/3 length from shaft edge.

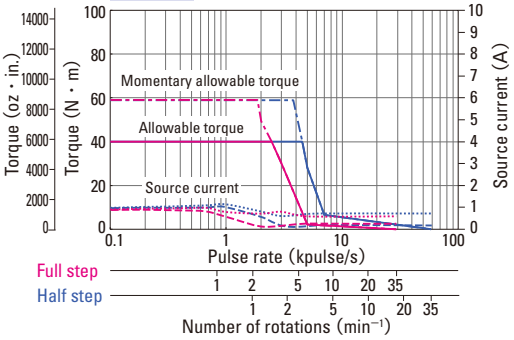
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

FAF851S-HX100
FAF851D-HX100

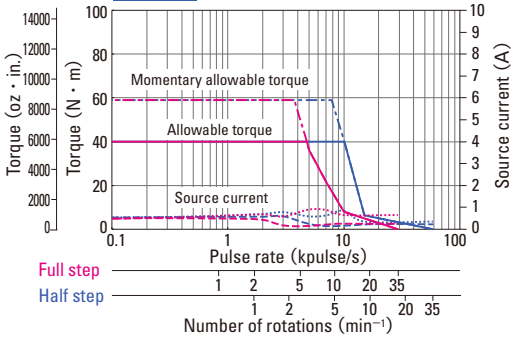
Momentary allowable torque Full step Half step
Source current (load applied) Full step Half step

DC24V



Allowable torque Full step Half step
Source current (no load) Full step Half step

DC48V



In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its momentary allowable torque will not be exceeded.
System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.102 to 103 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Electromagnetic brake model DC input Driver (Model number : F5PAE140P100) + Electromagnetic brake motor

Basic step angle : 0.72° Rated current : 1.4A/phase

Motor size			42mm sq. (1.65inch sq.)			60mm sq.(2.36inch sq.)
Motor length			64.5mm (2.54inch)	70.5mm (2.78inch)	79.5mm (3.13inch)	85.8mm (3.38inch)
Set ordering model no.			FAF551S-XB	FAF552S-XB	FAF554S-XB	FAF781S-XB
Corresponding motor model number			103F5505-82XB41	103F5508-82XB41	103F5510-82XB41	103F7851-82XB41
Holding torque		N · m (OZ · in)	0.13 (8.4)	0.18 (25.49)	0.25 (35.4)	0.55 (77.9)
Rotor inertia		X 10^{-4}kg · m^2 (OZ · in^2)	0.045 (0.25)	0.068 (0.37)	0.08 (0.44)	0.43 (2.35)
Motor mass (Note1)		kg (lbs)	0.38 (0.84)	0.43 (0.95)	0.52 (1.14)	0.94 (2.07)
Allowable thrust load		N (lbs)	10 (2.25)	10 (2.25)	10 (2.25)	20 (4.5)
Allowable radial load (Note2)		N (lbs)	35 (8.75)	35 (8.75)	35 (8.75)	80 (18)
Brake type		-	No excitation actuating type	No excitation actuating type	No excitation actuating type	No excitation actuating type
Electromagnetic brake	Power supply input	V	DC24V ± 5%	DC24V ± 5%	DC24V ± 5%	DC24V ± 5%
	Excitation current	A	0.08	0.08	0.08	0.25
	Power consumption	W	2	2	2	6
	Static friction torque	N · m (OZ · in)	0.3 (42.48)	0.3 (42.48)	0.3 (42.48)	0.8 (113.29)
	Brake operating time	ms	20	20	20	20
	Brake release time	ms	30	30	30	30

(Note1) Driver mass ▶ P.54

(Note2) When load is applied at 1/3 length from output shaft edge.

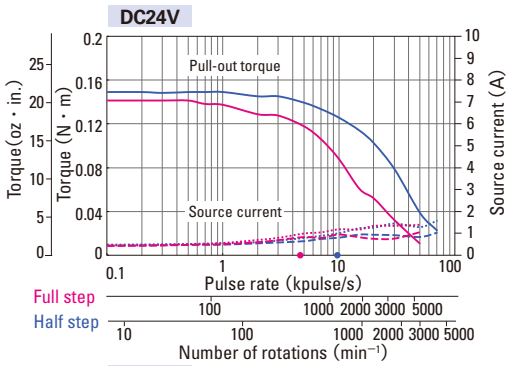
Characteristics

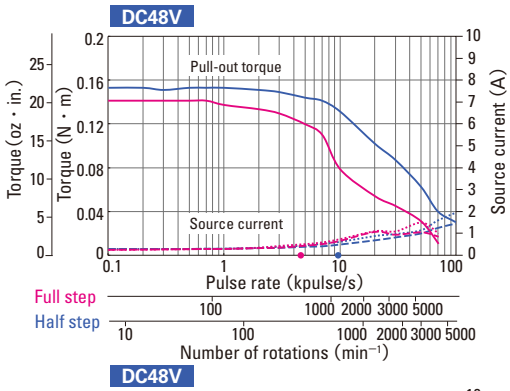
Operating current : 1.4A/phase
Use the rubber coupling

Pull-out torque Full step Half step
Source current (no load) Full step Half step

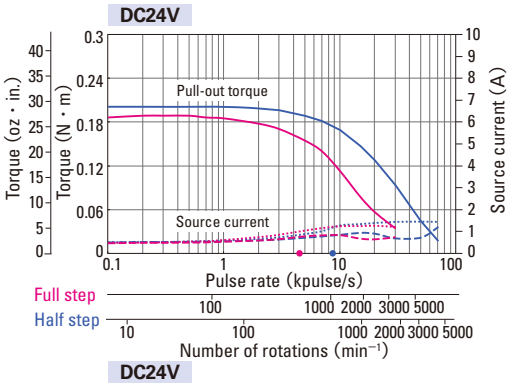
fs : Maximum self-start frequency when not loaded Full step Half step
Source current (load applied) Full step Half step

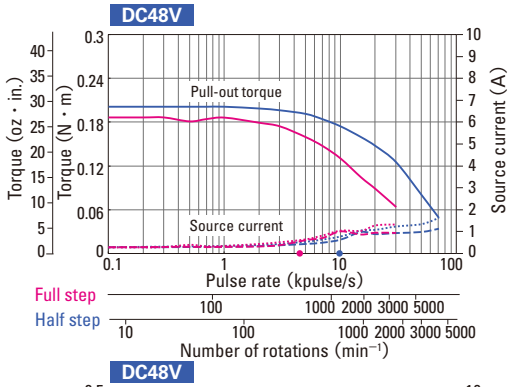
FAF551S-XB



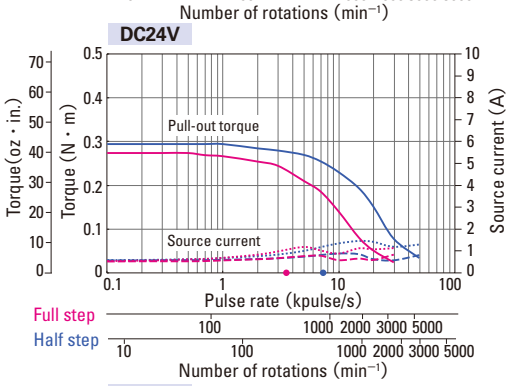


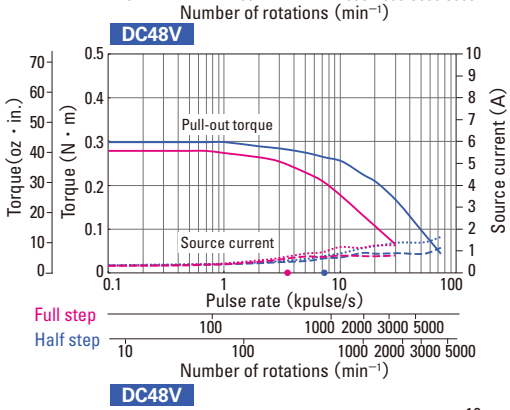
FAF552S-XB



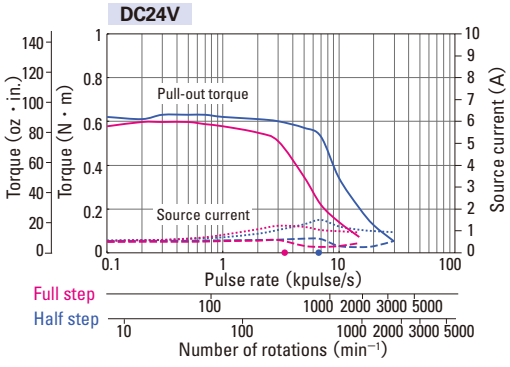


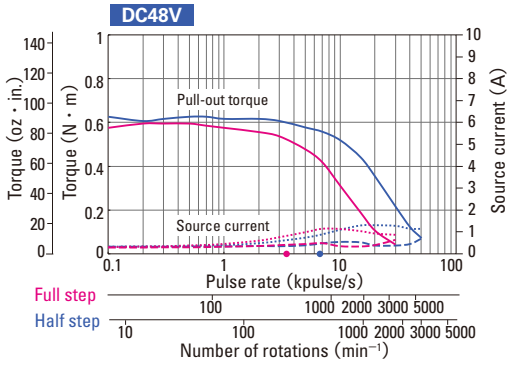
FAF554S-XB





FAF781S-XB





The electromagnetic brake only works when the motor is stopped, and cannot be used for braking.

System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.104 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Electromagnetic brake model DC input Driver (Model number : F5PAE140P100) + Electromagnetic brake motor

Basic step angle : 0.72° Rated current : 1.4A/phase

Motor size			60mm sq. (2.36inch sq.)		ϕ86mm (ϕ3.39inch)	
Motor length			94.5mm (3.72inch)	126.7mm (4.99inch)	116.7mm (4.59inch)	146.8mm (5.78inch)
Set ordering model no.			FAF782S-XB	FAF783S-XB	FAF851S-XB	FAF852S-XB
Corresponding motor model number			103F7852-82XB41	103F7853-82XB41	103F8581-82XB41	103F8582-82XB41
Holding torque		N · m (OZ · in)	0.87 (123.2)	1.67 (236.5)	2 (283.2)	4.02 (569.3)
Rotor inertia		X 10^{-4}kg · m^2 (OZ · in^2)	0.56 (3.06)	1 (5.47)	2.24 (12.25)	3.69 (20.18)
Motor mass (Note1)		kg (lbs)	1.12 (2.46)	1.7 (3.74)	3.5 (7.7)	4.5 (9.9)
Allowable thrust load		N (lbs)	20 (4.5)	20 (4.5)	60 (13.5)	60 (13.5)
Allowable radial load (Note2)		N (lbs)	80 (18)	80 (18)	220 (49.5)	220 (49.5)
Brake type		-	No excitation actuating type	No excitation actuating type	No excitation actuating type	No excitation actuating type
Electromagnetic brake	Power supply input	V	DC24V ± 5%	DC24V ± 5%	DC24V ± 5%	DC24V ± 5%
	Excitation current	A	0.25	0.25	0.42	0.42
	Power consumption	W	6	6	10	10
	Static friction torque	N · m (OZ · in)	0.8 (113.29)	0.8 (113.29)	5 (708.061)	5 (708.061)
	Brake operating time	ms	20	20	20	20
	Brake release time	ms	30	30	50	50

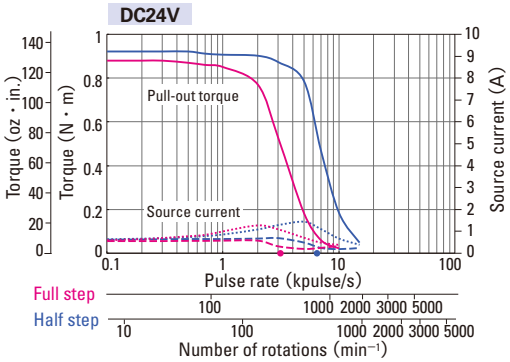
(Note1) Driver mass ▶ P.54
(Note2) When load is applied at 1/3 length from output shaft edge.

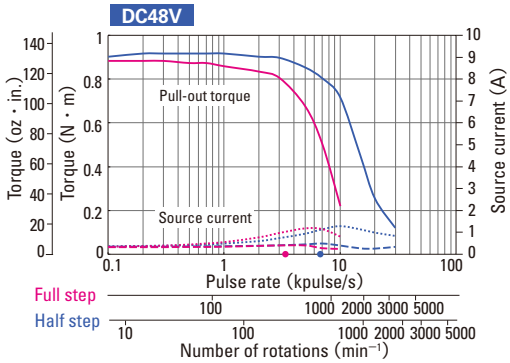
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

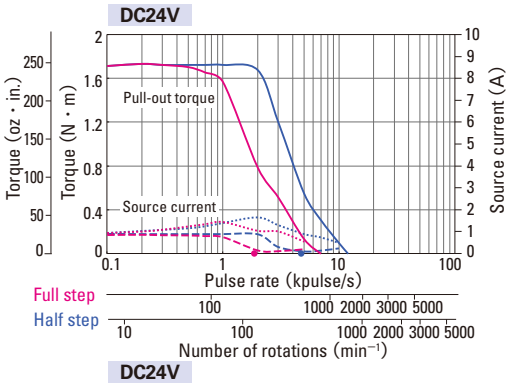
Pull-out torque Full step Half step
Source current (no load) Full step Half step
fs : Maximum self-start frequency when not loaded Full step Half step
Source current (load applied) Full step Half step

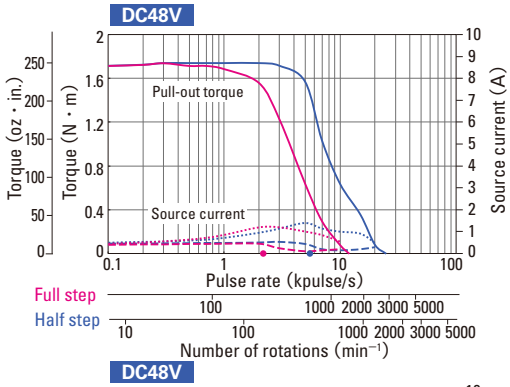
FAF782S-XB



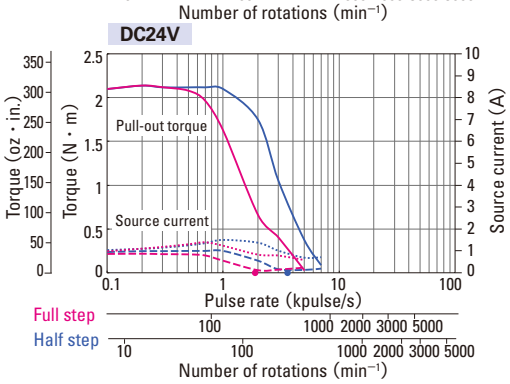


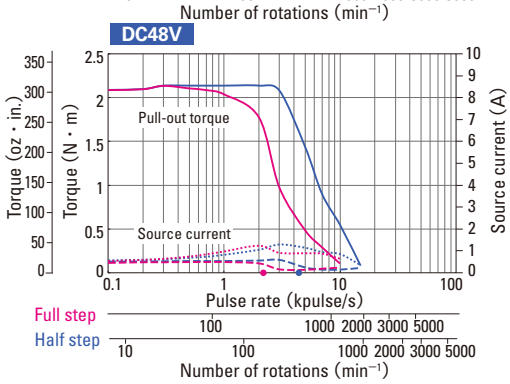
FAF783S-XB



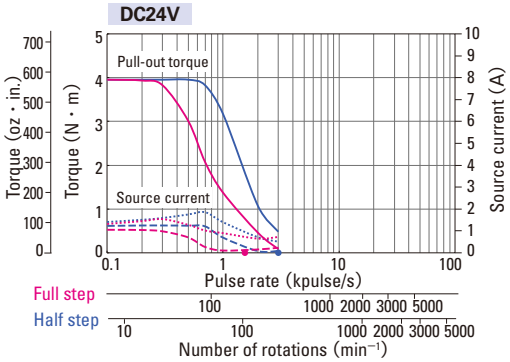


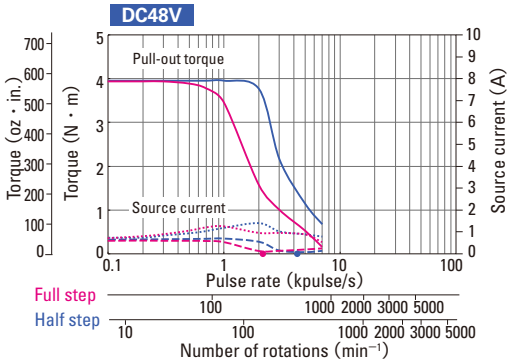
FAF851S-XB





FAF852S-XB





The electromagnetic brake only works when the motor is stopped, and cannot be used for braking.

System configuration ▶ P.34 Set Model Configuration ▶ P.36 Motor dimensions ▶ P.104 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor specifications

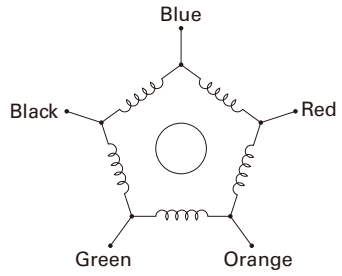
General specifications

Model number	**SH528** □	**103F55** □□／**103F785** □／**103F858** □
Ambient operation temperature	− 10 to + 50℃ (0 to + 40℃ for harmonic gear model)	
Storage temperature	− 20 to + 65℃	
Ambient operation humidity	20 to 90% RH (no condensation)	
Storage humidity	5 to 95% RH (no condensation)	
Operation altitude	1000 m (3280 feet) MAX. above sea level	
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 147 m/s² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.	
Impact resistance	490m/s² of acceleration for 11 ms with half-sine wave applying three times for X, Y, and Z axes each, 18 times in total.	
Insulation class	Class B (+ 130℃)	
Withstand voltage	At normal temperature and humidity, no failure with 500 V AC @50/60 Hz applied for one minute between motor winding and frame.	At normal ambient temperature and humidity, no failure with 1500 V AC @50/60 Hz applied for one minute between motor winding and frame.
Insulation resistance	At normal ambient temperature and humidity, 100 Mohm or more on megger with 500 V DC between motor winding and frame.	
Protection grade	IP40	
Wiringtemperature increase	80K MAX. (Based on Sanyo Denki standard)	
Axial play (Note1)	0.075mm (0.002952inch) MAX., Load 4.4N (1lbs)	0.075mm (0.002952inch) MAX., Load 9N (2lbs)
Radial play (Note2)	0.025mm (0.00098inch) MAX., Load 4.4N (1lbs)	
Shaft runout	0.025mm	
Inserted part concentricity against shaft	ϕ 0.05mm	ϕ 0.075mm
Fitted surface angularity against shaft	0.1mm	0.1mm

(Note1) Axial play: Shaft displacement under axial load.
(Note2) Radial play: Shaft displacement under radial load applied 1/3rd of the length from the end of the shaft.

Internal wire connection

Connection Method: New Pentagon



Direction of motor rotate

The direction of motor rotate is clockwise when viewed from the output shaft side at the direct current energization in the following order.

※ This is an instance of the standard model and the electromagnetic brake model.
As for some of the models with the gear, the direction of motor rotation is different, please make inquiries.

		Exciting order									
		1	2	3	4	5	6	7	8	9	10
Color of leads	Blue			+	+	+			−	−	−
	Red	−	−			+	+	+			−
	Orange		−	−	−			+	+	+	
	Green	+			−	−	−			+	+
	Black	+	+	+			−	−	−		

Driver specifications

General specifications

Basic specifications	Model number		**F5PAE140P100**
	Main circuit power		DC24V/48V ± 10% (Note1)
	Main circuit power supply current		3A
	Environment	Protection class	Class Ⅲ
		Operation environment	Installation category (over-voltage category) : Ⅰ (CE) Pollution level : 2
		Ambient operation temperature	0 to + 50℃
		Storage temperature	− 20 to + 70℃
		Ambient operation humidity	35 to 85%RH (no condensation)
		Storage humidity	10 to 90%RH (no condensation)
		Operation altitude	1000 m (3280 feet) MAX. above sea level
		Vibration resistance	Tested under the following conditions ; 5m/s², frequency range 10 to 55Hz, direction along X, Y and Z axes, for 2 hours each
		Impact resistance	20m/s²
		Withstand voltage	Not influenced when 1500V AC is applied between power input terminal and cabinet for one minute.
		Insulation resistance	10M ohm MIN. when measured with 500V DC megohmmeter between input terminal and cabinet.
	Mass		0.23kg
Functions	Selection function		Pulse-input method (single signal input/ simultaneous signal input), low-vibration drive/ micro-step drive), resolution (2-phase mode/ 5-phase mode), output signal (phase origin monitor/ alarm), operating current, step-angle
	Protection functions		Overcurrent protection
	LED indication		Monitoring power supply, displaying alarm(main power supply under- and overvoltage, regenerative fault, overcurrent fault, hardware fault)
I/O signals	Auto-Current-Down canceling input signal		Photo-coupler input system ; input resistance: 330 Ω ; input-signal "H" level : 4.5 to 5.5V ; input-signal "L" level : 0 to 0.5V
	Step-angle selection input		Photo-coupler input system ; input resistance: 330 Ω ; input-signal "H" level : 4.5 to 5.5V ; input-signal "L" level : 0 to 0.5V
	Command pulse input signal		Photocoupler-input method, input resistance: 330 Ω Input signal voltage Level H: 4.5 to 5.5V Level L: 0 to 0.5V Provided that voltage between Level H to L shall be 4.5V or over. Maximum input frequency: 400kpulse/s
	Power down input signal		Photo-coupler input system ; input resistance: 330 Ω ; input-signal "H" level : 4.5 to 5.5V ; input-signal "L" level : 0 to 0.5V
	Input signal/Output signal		Open collector output via photocoupler Output signal standard Vceo: 30V or less (Note2) Ic: 5mA or less Vce (sat): 1.0V or less

(Note1) Use either DC24V ± 10% or DC48V ± 10% for main circuit power supply. Make sure never exceed DC60V, even if power supply voltage increases due to counter-electromotive force after misstep occurs. If there are any possibilities of exceeding DC60V, connect optional regenerative resistor. Regenerative resistor use is recommended if you operate with 60mm sq. (2.36inch sq.) or ⌀86mm (⌀3.39inch) motor.

(Note2) Make sure the voltage used for output signal is DC5V or over.

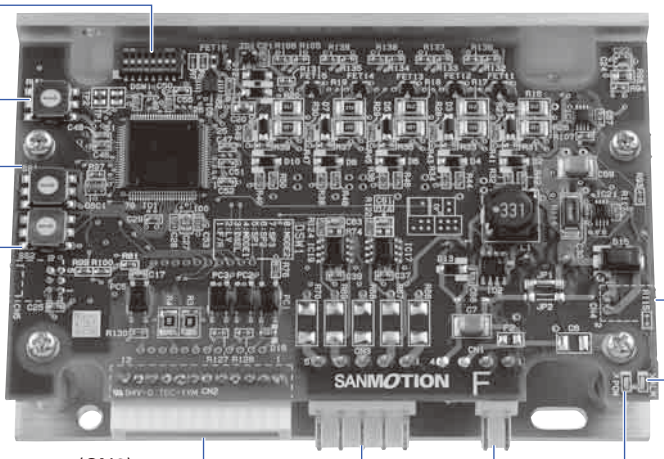
Safety standards

	Directives	Category	Standard part	Name
CE (TÜV)	Low-voltage directives	−	EN61800-5-1	−
	EMC directives	Emission	EN61000-6-4	Conducted emissions test
			EN61000-6-4	Electromagnetic radiation disturbance
		Immunity	EN61000-4-2	ESD (Electrostatic discharge)
			EN61000-4-3	RS (Radio-frequency amplitude modulated electromagnetic field)
			EN61000-4-4	Fast transionts
			EN61000-4-5	CS (Radio-frequency common mode)
			EN61000-4-6	Surges
UL	Acquired standards		Standard part	File No.
	UL		UL508C	E179775
	UL for Canada (c-UL)			

・EMC characteristics may vary depending on the configuration of the users' control panel, which contains the driver or stepping motor, or the arrangement and wiring of other electrical devices.

・Validation test of driver has been performed for low-voltage EMC directives at TUV (TUV SUD Japan) for self-declaration of CE marking.

Driver Controls and Connectors



2 Function selection DIP switch (DSW1)

1 Current selection switch (RUN)

3 Step angle selection switch (SS1, SS2)

Connector for regeneration resistor※ (CN4)
※ Optional Accessories

5 Alarm LED (ALM)

4 Power LED (POW)

Input/output signal interface connector (CN2)

Motor interface connector (CN3)

Power connector (CN1)

1 Current selection switch (RUN)

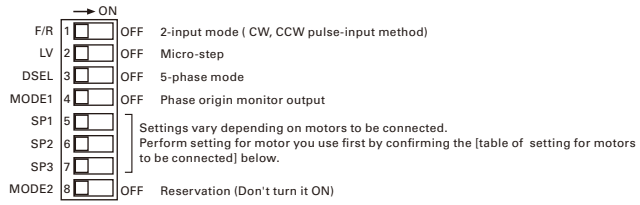
Rotary switch selects motor operating current.

Dial	0	1	2	3	4	5	6	7
Stepping motor current (A)	1.4	1.35	1.3	1.25	1.2	1.15	1.1	1.05
Dial	8	9	A	B	C	D	E	F
Stepping motor current (A)	1.0	0.95	0.9	0.85	0.8	0.75	0.7	0.65

- The factory default value is F(0.65A).
  Please check the rated current of the motor to be combined before selecting the operation current.
- If there are sufficient margin of motor torque, decreasing operating current value becomes effective for vibration reduction. Motor output torque is approximately proportional to current.
- Make sure to confirm there are sufficient operation margin before determining motor current value to adjust operating current.

2 Function selection DIP switch (DSW1)

Selects the function according to application method.
Factory default settings



- Perform setting for motor to be connected first.
- Make sure to turn off power supply of the driver when changing setting s of function selection DIP switch.

[Table of setting for motors to be connected]

SP1	SP2	SP3	Motor to be connected
OFF	OFF	OFF	SH5281-72 □□, SH5285-72 □□, 103F5505-82 □□
OFF	OFF	ON	103F5508-82 □□
OFF	ON	OFF	103F5510-82 □□
OFF	ON	ON	103F7851-82 □□
ON	OFF	OFF	103F7852-82 □□
ON	OFF	ON	103F7853-82 □□, 103F8581-82 □□
ON	ON	OFF	103F8582-82 □□

1. Pulse inputting method selection (F/R)

Pulse inputting method can be selected:

F/R	Pulse input method
ON	1 input (CK, U/D)
OFF	2 input (CW, CCW)

2. Low-vibration mode select (LV)

Provides low-vibration, smooth operation even if resolution is rough (1-division, 2-division, etc)

LV	Operation
ON	Low-vibration drive
OFF	Micro-step

3. Resolution selection (DSEL)

Mode of step-angle selection switch (SS1, SS2) can be selected:

DSEL	Resolution mode
ON	2-phase mode: Operation as normal 2-phase stepping system at 1.8˚ to 0.00703125˚ -step angle is available.
OFF	5-phase mode: Operation as normal 5-phase stepping system at 0.72˚ to 0.00288˚ -step angle is available.

4. Output signal selection (MODE1)

Output signal can be selected:

MODE1	Output signal
ON	Alarm output
OFF	Phase origin monitor output

5 to 7. Motor selection (SP1, SP2, SP3)

Perform setting for motor you use first by confirming the [table of setting for motors to be connected].

8. (MODE2)

Do not turn ON this switch.

3 Step angle selection switch (SS1, SS2)

Division number of primary step angle for stepping motor can be selected by means of this rotary switch.

After selecting 2- or 5-phase mode by function selection DIP switch 3 (DSEL), set the step angle selection switches for the desired step angle.

5-Phase Mode: DSW1 function selection DIP switch 3 = OFF				2-Phase Mode: DSW1 function selection DIP switch 3 = ON			
SS1,SS2	Number of divisions	Resolution	Basic step angle	SS1,SS2	Number of divisions	Resolution	Basic step angle
0	1	500	0.72˚	0	0.4	200	1.8˚
1	2	1000	0.36˚	1	0.8	400	0.9˚
2	2.5	1250	0.288˚	2	1.6	800	0.45˚
3	4	2000	0.18˚	3	2	1000	0.36˚
4	5	2500	0.144˚	4	3.2	1600	0.225˚
5	8	4000	0.09˚	5	4	2000	0.18˚
6	10	5000	0.072˚	6	6.4	3200	0.1125˚
7	20	10000	0.036˚	7	10	5000	0.072˚
8	25	12500	0.0288˚	8	12.8	6400	0.05625˚
9	40	20000	0.018˚	9	20	10000	0.036˚
A	50	25000	0.0144˚	A	25.6	12800	0.028125˚
B	80	40000	0.009˚	B	40	20000	0.018˚
C	100	50000	0.0072˚	C	50	25000	0.0144˚
D	125	62500	0.00576˚	D	51.2	25600	0.0140625˚
E	200	100000	0.0036˚	E	100	50000	0.0072˚
F	250	125000	0.00288˚	F	102.4	51200	0.00703125˚

- Factory default setting: SS1 = 1 and SS2 = 0
- Set the step angle selection input (DSEL) to select SS1 or SS2, then set the rotary switch.

4 Power LED (POW)

Lights when control and main circuits are energized.

5 Alarm LED (ALM)

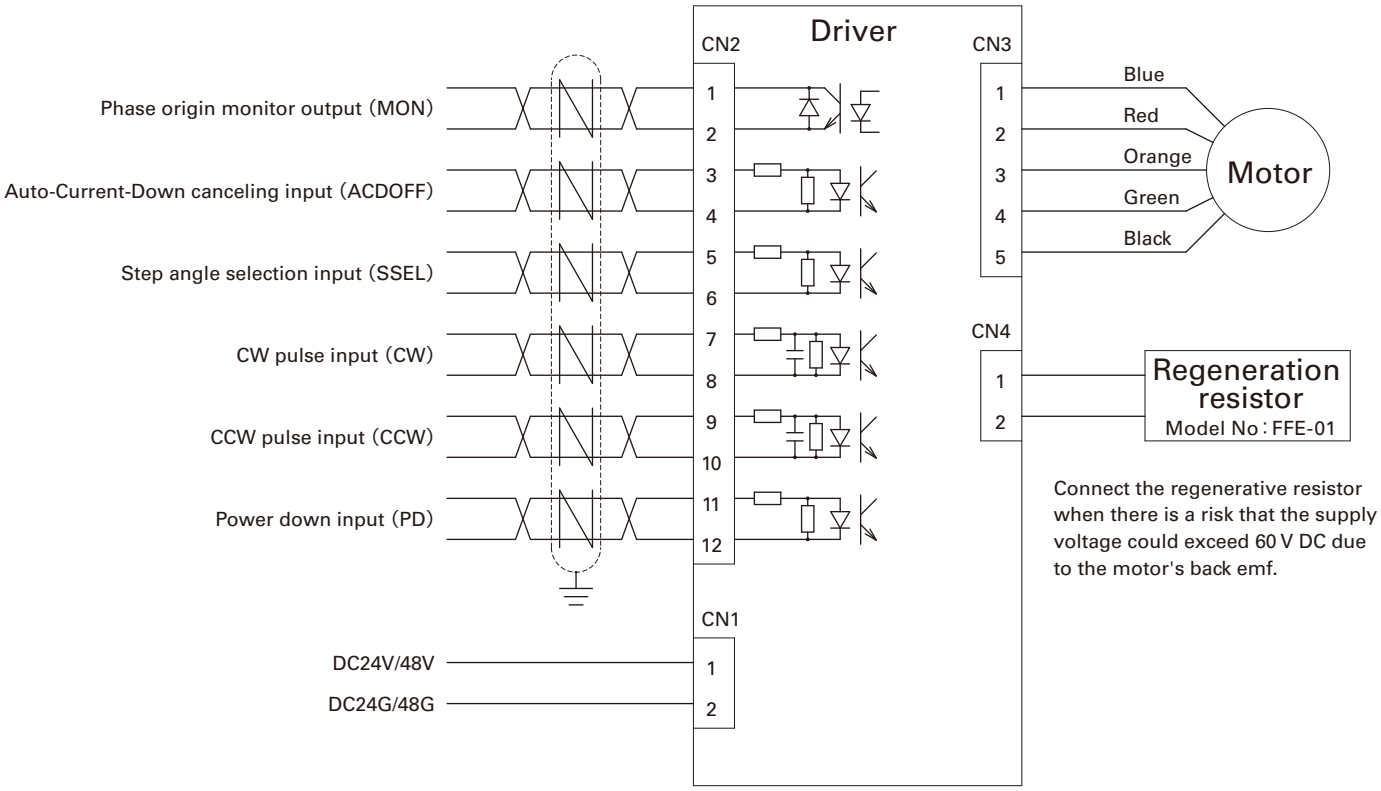
Flashes to indicate alarm events.

Indication	Explanation
"ALM" repeats single-flashing.	Main power supply voltage drop (Detected when excitation is on.)
"ALM" repeats double-flashing.	Overvoltage of main power supply (Detected when motor stops.)
"ALM" repeats triple-flashing.	Regeneration error (Detected when motor is operating.)
"ALM" repeats quadruple-flashing.	Overcurrent error
"ALM" repeats five-times-flashing.	Hardware error

- When alarm activated, stepping motor winding current is interrupted and then the state becomes "not-excited" at the same time that LED "ALM" flahes.
  When "DSW1: MODE1" is set to ON, signal is output outward from alarm output terminal (AL). (Photocoupler is turned on.)
  This state is maintained until the power supply is turned off. Please re-turn on the power supply after eliminating alarm cause.

Connections and Signals

External wiring diagram



Connect the regenerative resistor when there is a risk that the supply voltage could exceed 60 V DC due to the motor's back emf.

Applicable wire sizes

Part	Applicable wire	Insulation diameter	Wiring length
Power supply	AWG20 (0.5mm^2) to AWG18 (0.75mm^2)	ϕ 1.7 to ϕ 3.0mm	Less than 3m
Input/output signal	AWG24 (0.2mm^2) to AWG22 (0.3mm^2)	ϕ 1.15 to ϕ 1.8mm	Less than 3m
Motor	AWG20 (0.5mm^2) to AWG18 (0.75mm^2)	ϕ 1.7 to ϕ 3.0mm	10m max.

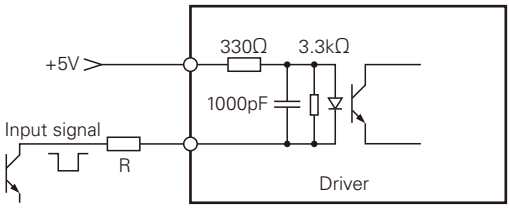
When bundling wire together or running wires through duct, take reduction rate of each wire allowable current into consideration. When ambient temperature is relatively high, wire product lifetime is reduced due to heat deterioration. In this case, please use Heat resistant Indoor PVC (HIV).

Specification summary of CN2 I/O signal

Signal name	CN2 Pin number	Function
Phase origin monitor output (standard)	1 2	DSW1 MODE1=OFF Photocoupler is turned on when excitation phase is the origin (the state power supply is turned on).
Alarm output	1 2	DSW1 MODE1=ON Photocoupler is turned on when the driver is in the state of alarm being activated.
Auto-Current-Down canceling input	3 4	Inputting this signal (internal photpcoupler is turned on) disables Auto-Current-Down function.
Step angle selection input	5 6	Division numbers can be switched via SSEL-signal. Internal photocoupler is OFF ··· Setting via rotary switch SS1 enabled Internal photocoupler is ON ··· Setting via rotary switch SS2 enabled
CW pulse input (standard)	7 8	When using "2-input mode" Drive pulse for the CW direction rotation is input.
Pulse column input	7 8	When using "Pulse and direction mode" Drive pulse train for the stepping motor rotation is input.
CCW pulse input (standard)	9 10	When using "2-input mode" Drive pulse for the CCW direction rotation is input.
Rotation direction input	9 10	The rotation direction signal of stepping motor is input for the "Pulse and direction mode". Internal photocoupler ON ··· CW direction Internal photocoupler OFF ··· CCW direction
Power down input	11 12	Inputting this signal (internal photocoupler is turned on) shuts off the current carried to motor.

The CW rotation direction of stepping motor means the clockwise direction rotation as viewed from the output shaft side (ange side).
The CCW rotation direction means the counterclockwise direction rotation as viewed from the output shaft side (ange side).

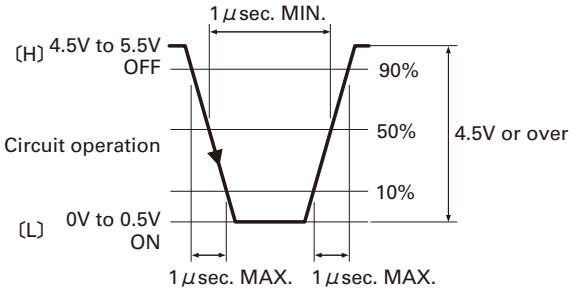
Input circuit configuration of CW (CK), CCW (U/D)



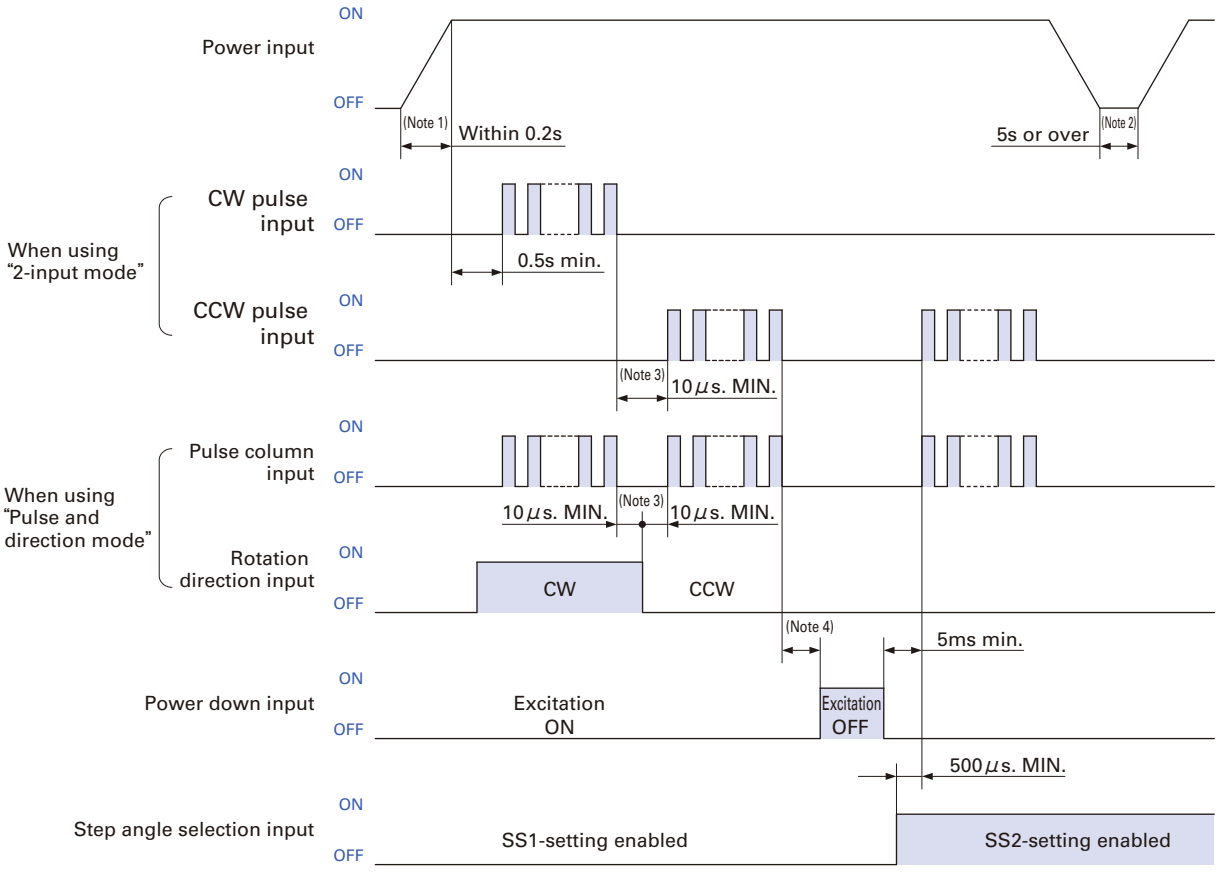
- Pulse duty 50% MAX.
- Maximum input frequency: 400kpulse/s
- When crest value of input signal exceeds 5V, add external limiting resistor R so that input current becomes approximately 10mA.
  (Consider photocoupler forward voltage: 1.5V)

Input signal specification

〈Photo coupler〉



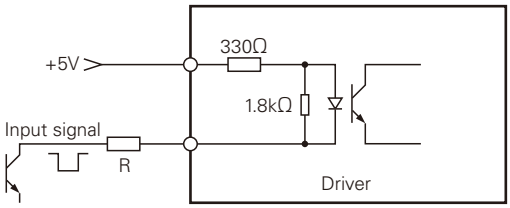
Timing of command pulse



- The frequency of the power ON/OFF of the driver shall be 5 times/hour or less and 30 times/day or less.
- ■ indicates ON of photocoupler emitting side.
- When operating in double-input method, and then inputting pulse into CW, set CCW-side to "OFF."
  When inputting pulse into CCW, set CW-side to "OFF."
- For input mode 1, CK should be off when switching input signal U/D.

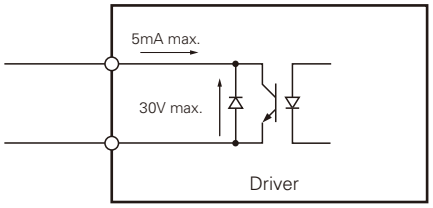
(Note1) The time for the power supply to be established shall be within 0.2 seconds.
(Note2) Re-turning on the power supply shall be at intervals of more than 5 seconds.
(Note3) "10 μ s or more" shown above is response time within driver internal circuit, so set the time such that motor can response.
(Note4) Input power-down input signal in the state motor has been settled.

Input circuit configuration of ACDOFF, SSEL, PD

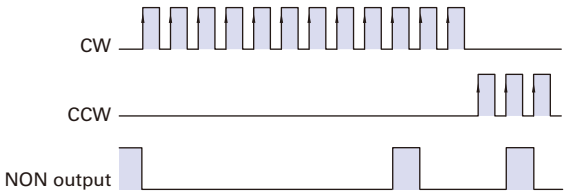


- When crest value of input signal exceeds 5V, add external limiting resistor R so that input current becomes approximately 10mA.
  (Consider photocoupler forward voltage: 1.5V)

Output signal configuration of MON, AL



MON output

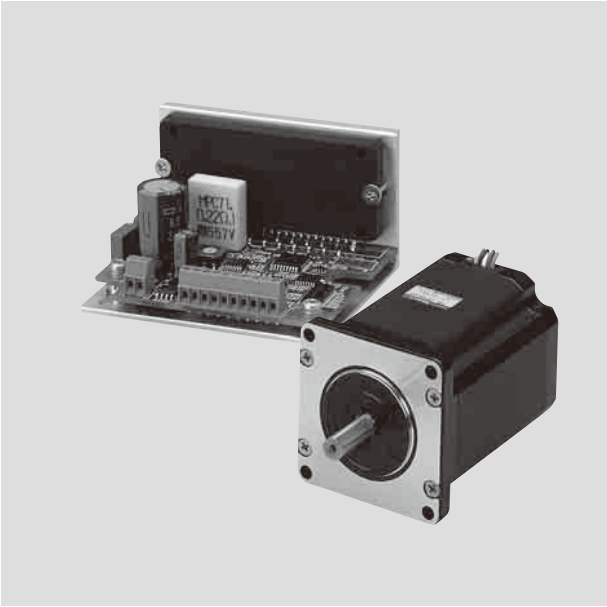


Example: 5-phase, full-division (Full Step)

- Photo coupler at phase origin of motor excitation (status at power on) is set to “ON”
- Inputting pulse turns on photocoupler every 7.2° of motor output axis from phase origin.
- Set command frequency to 50kpulse/s or less to use phase origin monitor.
- Perform switching of division number via step-angle selection input signal (SSEL) with phase origin monitor output turned on and motor being stopped.
- Switching division number at the point other than excitation origin may cause that phase origin monitor output is not correctly output.

DC input Set model
Full / half step

Set Model Configuration ▶ P.62
Specifications · Characteristics ▶ P.63 to 77
Motor specifications ▶ P.78 Driver specifications ▶ P.79
Motor dimensions ▶ P.97 to 104 Driver dimensions ▶ P.105



Features

・This DC driver and stepping motor set supports full- and half-step selection.

Set model configuration items

Driver

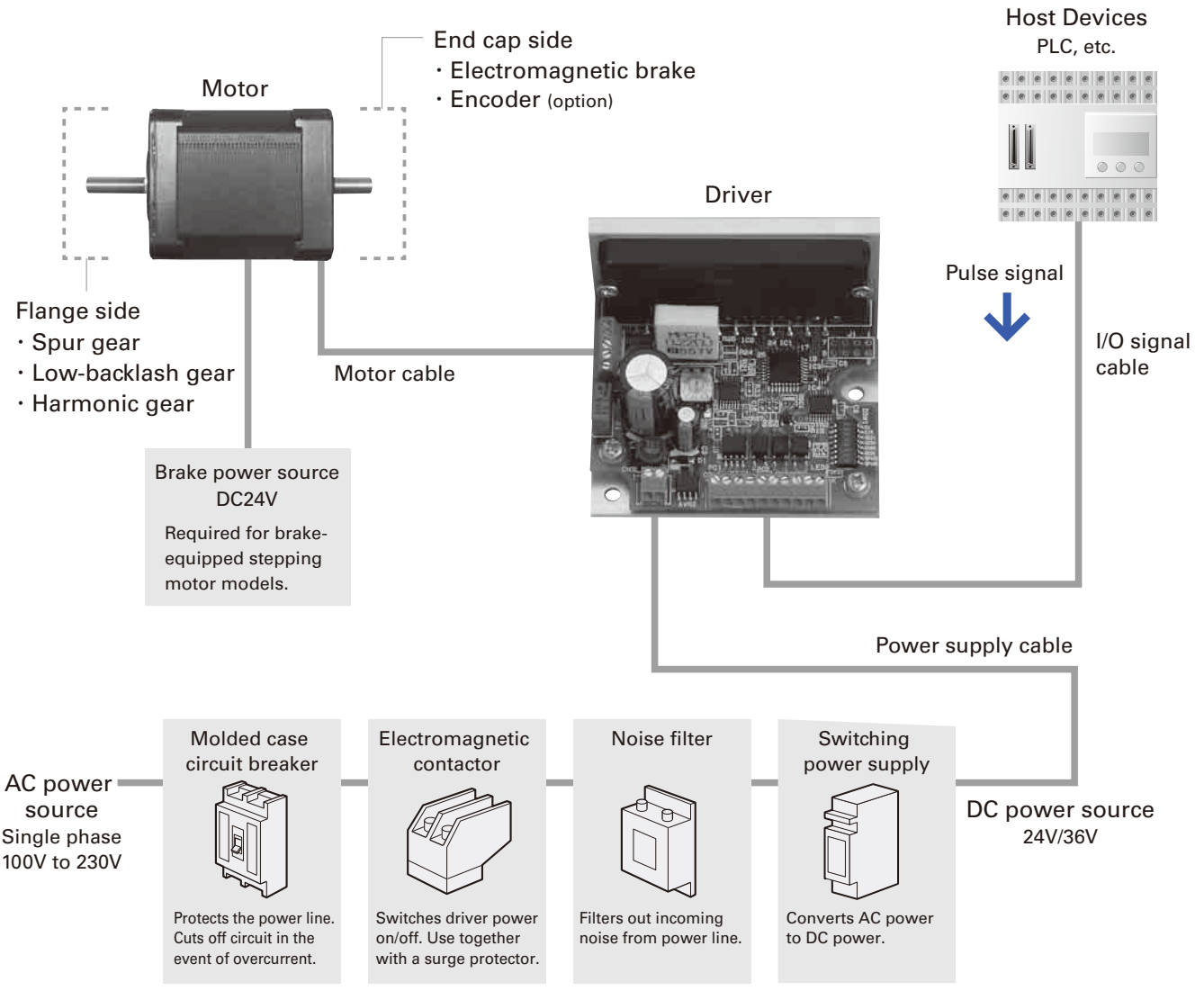
Model number : FS1D140P10 Power supply : DC24V/36V

Motor

Motor sise : 28mm sq. (1.10inch sq.),
42mm sq. (1.65inch sq.), 60mm sq. (2.36inch sq.),
ϕ86mm (ϕ3.39inch)

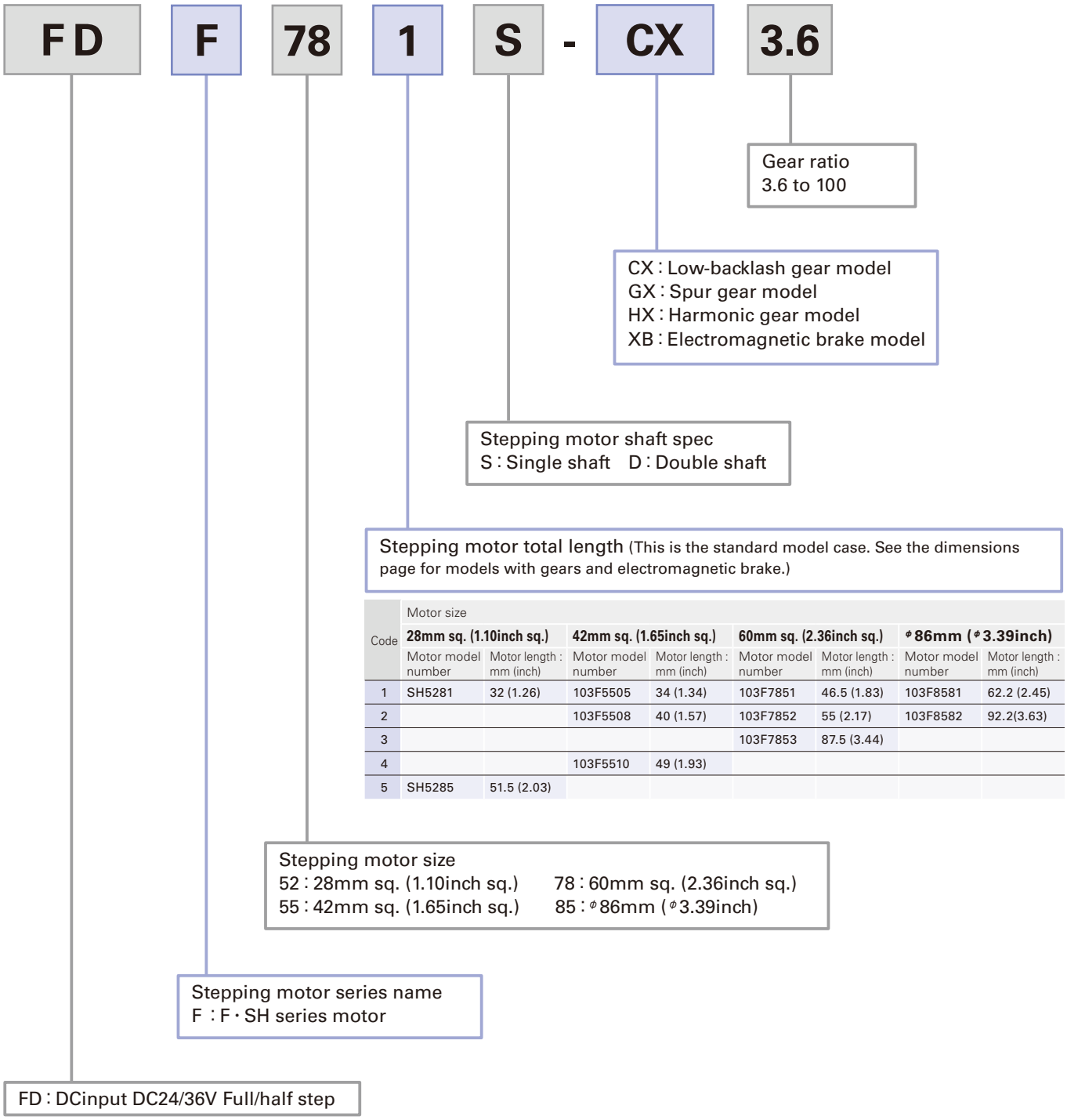
・Instruction manuals can be downloaded from our website.
・Prepare the cable according to the applicable wire sizes on P.81.

System configuration



Model number convention

Example: The model number of the set with a DC driver and motor model 103F7851-82CXA4 is composed as follows. This motor is specified as 60mm sq. (2.36inch sq.) and 92mm (3,62inch) long (motor + gear), single shaft, with low back-lash gears.



Code	Motor size							
	28mm sq. (1.10inch sq.)		42mm sq. (1.65inch sq.)		60mm sq. (2.36inch sq.)		ϕ86mm (ϕ3.39inch)	
	Motor model number	Motor length : mm (inch)	Motor model number	Motor length : mm (inch)	Motor model number	Motor length : mm (inch)	Motor model number	Motor length : mm (inch)
1	SH5281	32 (1.26)	103F5505	34 (1.34)	103F7851	46.5 (1.83)	103F8581	62.2 (2.45)
2			103F5508	40 (1.57)	103F7852	55 (2.17)	103F8582	92.2(3.63)
3					103F7853	87.5 (3.44)		
4			103F5510	49 (1.93)				
5	SH5285	51.5 (2.03)						

Set Model Configuration

This is a set comprising a driver and motor.

DC input driver Model No. : FS1D140P10

Basic step angle/0.72°

Model	Motor size	Single shaft		Double shaft		Rated current (A/phase)	Page	
		Set model number	Set accessories Motor model number	Set model number	Set accessories Motor model number		Specifications	Dimensions
Standard model	28mm sq. (1.10inch sq.)	FDF521S	SH5281-7241	FDF521D	SH5281-7211	0.75	P.63	P.97
		FDF525S	SH5285-7241	FDF525D	SH5285-7211	0.75	P.63	P.97
	42mm sq. (1.65inch sq.)	FDF551S	103F5505-8241	FDF551D	103F5505-8211	1.4	P.63	P.97
		FDF552S	103F5508-8241	FDF552D	103F5508-8211	1.4	P.63	P.97
		FDF554S	103F5510-8241	FDF554D	103F5510-8211	1.4	P.64	P.97
	60mm sq. (2.36inch sq.)	FDF781S	103F7851-8241	FDF781D	103F7851-8211	1.4	P.64	P.98
		FDF782S	103F7852-8241	FDF782D	103F7852-8211	1.4	P.64	P.98
		FDF783S	103F7853-8241	FDF783D	103F7853-8211	1.4	P.64	P.98
	φ86mm (φ3.39inch)	FDF851S	103F8581-8241	FDF851D	103F8581-8211	1.4	P.65	P.99
		FDF852S	103F8582-8241	FDF852D	103F8582-8211	1.4	P.65	P.99
Low-backlash gear model	42mm sq. (1.65inch sq.)	FDF551S-CX3.6	103F5505-82CXA4	FDF551D-CX3.6	103F5505-82CXA1	1.4	P.66	P.101
		FDF551S-CX7.2	103F5505-82CXB4	FDF551D-CX7.2	103F5505-82CXB1	1.4	P.66	P.101
		FDF551S-CX10	103F5505-82CXE4	FDF551D-CX10	103F5505-82CXE1	1.4	P.66	P.101
		FDF551S-CX20	103F5505-82CXG4	FDF551D-CX20	103F5505-82CXG1	1.4	P.66	P.101
		FDF551S-CX30	103F5505-82CXJ4	FDF551D-CX30	103F5505-82CXJ1	1.4	P.67	P.101
		FDF551S-CX36	103F5505-82CXK4	FDF551D-CX36	103F5505-82CXK1	1.4	P.67	P.101
	60mm sq. (2.36inch sq.)	FDF781S-CX3.6	103F7851-82CXA4	FDF781D-CX3.6	103F7851-82CXA1	1.4	P.67	P.101
		FDF781S-CX7.2	103F7851-82CXB4	FDF781D-CX7.2	103F7851-82CXB1	1.4	P.67	P.101
		FDF781S-CX10	103F7851-82CXE4	FDF781D-CX10	103F7851-82CXE1	1.4	P.68	P.101
		FDF781S-CX20	103F7851-82CXG4	FDF781D-CX20	103F7851-82CXG1	1.4	P.68	P.101
		FDF781S-CX30	103F7851-82CXJ4	FDF781D-CX30	103F7851-82CXJ1	1.4	P.68	P.101
		FDF781S-CX36	103F7851-82CXK4	FDF781D-CX36	103F7851-82CXK1	1.4	P.68	P.101
	φ86mm (φ3.39inch)	FDF851S-CX3.6	103F8581-82CXA4	FDF851D-CX3.6	103F8581-82CXA1	1.4	P.69	P.101
		FDF851S-CX7.2	103F8581-82CXB4	FDF851D-CX7.2	103F8581-82CXB1	1.4	P.69	P.101
		FDF851S-CX10	103F8581-82CXE4	FDF851D-CX10	103F8581-82CXE1	1.4	P.69	P.101
		FDF851S-CX20	103F8581-82CXG4	FDF851D-CX20	103F8581-82CXG1	1.4	P.69	P.101
		FDF851S-CX30	103F8581-82CXJ4	FDF851D-CX30	103F8581-82CXJ1	1.4	P.70	P.101
		FDF851S-CX36	103F8581-82CXK4	FDF851D-CX36	103F8581-82CXK1	1.4	P.70	P.101
Spur gear model	28mm sq. (1.10inch sq.)	FDF521S-GX3.6	SH5281-72GXA4	FDF521D-GX3.6	SH5281-72GXA1	0.75	P.71	P.102
		FDF521S-GX7.2	SH5281-72GXB4	FDF521D-GX7.2	SH5281-72GXB1	0.75	P.71	P.102
		FDF521S-GX10	SH5281-72GXE4	FDF521D-GX10	SH5281-72GXE1	0.75	P.71	P.102
		FDF521S-GX20	SH5281-72GXG4	FDF521D-GX20	SH5281-72GXG1	0.75	P.71	P.102
		FDF521S-GX30	SH5281-72GXJ4	FDF521D-GX30	SH5281-72GXJ1	0.75	P.72	P.102
		FDF521S-GX50	SH5281-72GXL4	FDF521D-GX50	SH5281-72GXL1	0.75	P.72	P.102
Harmonic gear model	28mm sq. (1.10inch sq.)	FDF521S-HX50	SH5281-72HXL4	FDF521D-HX50	SH5281-72HXL1	0.75	P.73	P.102
		FDF521S-HX100	SH5281-72HXM4	FDF521D-HX100	SH5281-72HXM1	0.75	P.73	P.102
	42mm sq. (1.65inch sq.)	FDF551S-HX30	103F5505-82HXJ5	FDF551D-HX30	103F5505-82HXJ2	1.4	P.73	P.102
		FDF551S-HX50	103F5505-82HXL5	FDF551D-HX50	103F5505-82HXL2	1.4	P.73	P.102
		FDF551S-HX100	103F5505-82HXM5	FDF551D-HX100	103F5505-82HXM2	1.4	P.74	P.102
	60mm sq. (2.36inch sq.)	FDF781S-HX50	103F7851-82HXL4	FDF781D-HX50	103F7851-82HXL1	1.4	P.74	P.103
		FDF781S-HX100	103F7851-82HXM4	FDF781D-HX100	103F7851-82HXM1	1.4	P.74	P.103
	φ86mm (φ3.39inch)	FDF851S-HX50	103F8581-82HXL4	FDF851D-HX50	103F8581-82HXL1	1.4	P.74	P.103
		FDF851S-HX100	103F8581-82HXM4	FDF851D-HX100	103F8581-82HXM1	1.4	P.75	P.103
Electromagnetic brake model	42mm sq. (1.65inch sq.)	FDF551S-XB	103F5505-82XB41	—	—	1.4	P.76	P.104
		FDF552S-XB	103F5508-82XB41	—	—	1.4	P.76	P.104
		FDF554S-XB	103F5510-82XB41	—	—	1.4	P.76	P.104
	60mm sq. (2.36inch sq.)	FDF781S-XB	103F7851-82XB41	—	—	1.4	P.76	P.104
		FDF782S-XB	103F7852-82XB41	—	—	1.4	P.77	P.104
		FDF783S-XB	103F7853-82XB41	—	—	1.4	P.77	P.104
	φ86mm (φ3.39inch)	FDF851S-XB	103F8581-82XB41	—	—	1.4	P.77	P.104
		FDF852S-XB	103F8582-82XB41	—	—	1.4	P.77	P.104

Standard model DC input Driver (Model number : FS1D140P10) + Standard motor

Basic step angle : 0.72° Rated current : 28mm sq. (1.10inch sq.) Motor 0.75A/phase, 42mm sq. (1.65inch sq.) to □86mm(□3.39inch) Motor 1.4A/phase

Motor size		28mm sq. (1.10inch sq.)		42mm sq. (1.65inch sq.)	
Motor length		32mm (1.26inch)	51.5mm (2.03inch)	34mm (1.34inch)	40mm (1.57inch)
Single shaft	Set ordering model no.	FDF521S	FDF525S	FDF551S	FDF552S
	Corresponding motor model number	SH5281-7241	SH5285-7241	103F5505-8241	103F5508-8241
Double shaft	Set ordering model no.	FDF521D	FDF525D	FDF551D	FDF552D
	Corresponding motor model number	SH5281-7211	SH5285-7211	103F5505-8211	103F5508-8211
Holding torque	N · m (OZ · in)	0.041 (5.81)	0.078 (11.05)	0.13 (18.41)	0.18 (25.49)
Rotor inertia	X 10^{-4}kg · m² (OZ · in²)	0.01 (0.05)	0.022 (0.09)	0.03 (0.16)	0.053 (0.29)
Motor mass (Note1)	kg (lbs)	0.11 (0.22)	0.2 (0.44)	0.23 (0.50)	0.28 (0.62)
Allowable thrust load	N (lbs)	3 (0.68)	3 (0.68)	10 (2.25)	10 (2.25)
Allowable radial load (Note2)	N (lbs)	42 (9.44)	53 (11.91)	35 (8.75)	35 (8.75)

(Note1) Driver mass ▶ P.79
(Note2) When load is applied at 1/3 length from output shaft edge.

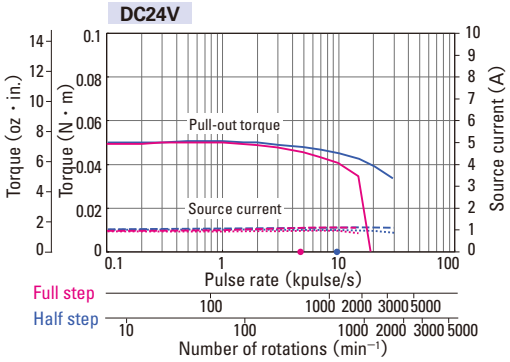
Characteristics

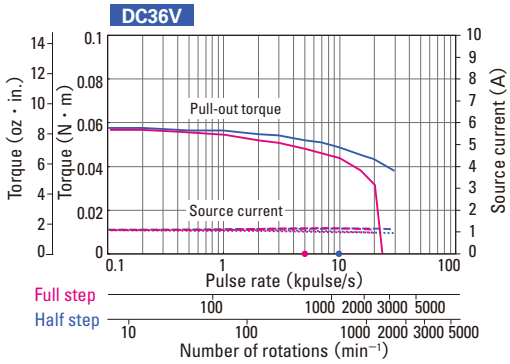
Use the rubber coupling

Allowable torque Full step ——— Half step ———
Source current (no load) Full step - - - Half step - - -
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

FDF521S FDF521D

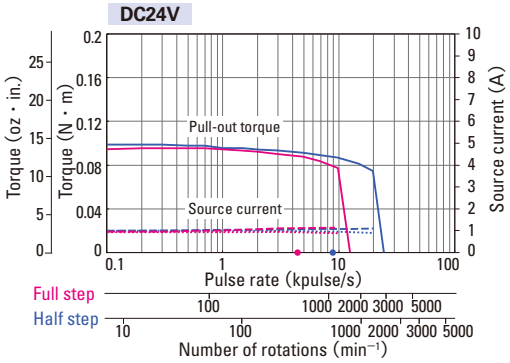
Operating current : 0.75A/phase

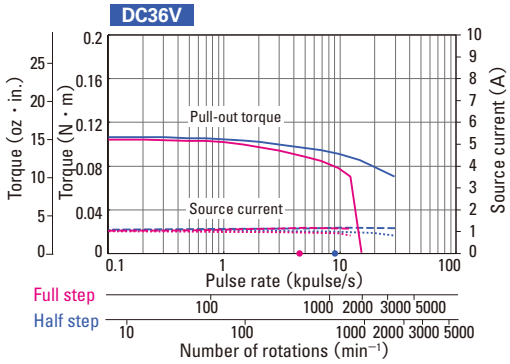




FDF525S FDF525D

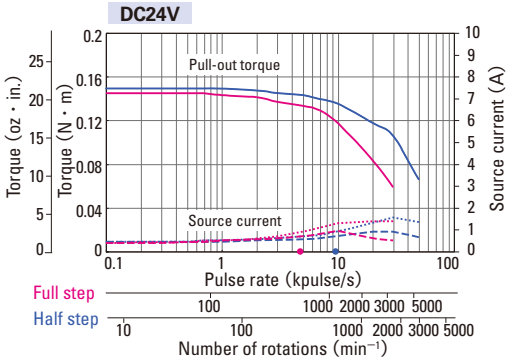
Operating current : 0.75A/phase

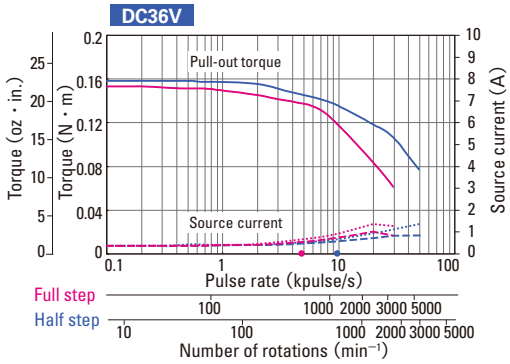




FDF551S FDF551D

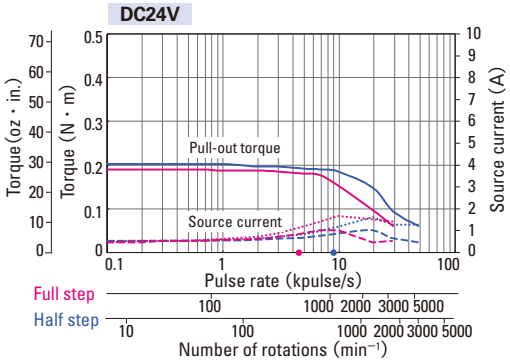
Operating current : 1.4A/phase

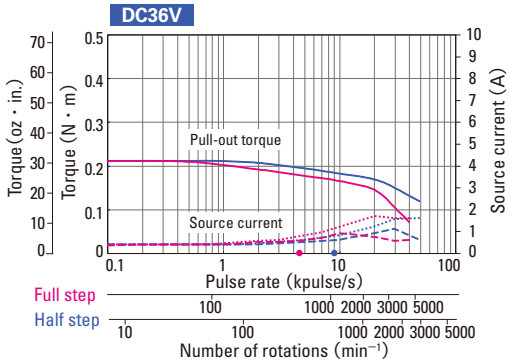




FDF552S FDF552D

Operating current : 1.4A/phase





System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.97 to 100 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Standard model DC input Driver (Model number : FS1D140P10) + Standard motor

Basic step angle : 0.72° Rated current : 28mm sq. (1.10inch sq.) Motor 0.75A/phase, 42mm sq. (1.65inch sq.) to ⌀86mm(⌀3.39inch) Motor 1.4A/phase

Motor size		42mm sq. (1.65inch sq.)	60mm sq. (2.36inch sq.)		
Motor length		49mm (1.93inch)	46.5mm (1.83inch)	55mm (2.17inch)	87.5mm (3.45inch)
Single shaft	Set ordering model no.	FDF554S	FDF781S	FDF782S	FDF783S
	Corresponding motor model number	103F5510-8241	103F7851-8241	103F7852-8241	103F7853-8241
Double shaft	Set ordering model no.	FDF554D	FDF781D	FDF782D	FDF783D
	Corresponding motor model number	103F5510-8211	103F7851-8211	103F7852-8211	103F7853-8211
Holding torque	N · m (OZ · in)	0.25 (35.4)	0.55 (77.9)	0.87 (123.2)	1.67 (236.5)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	0.065 (0.36)	0.275 (1.50)	0.4 (2.19)	0.84 (4.59)
Motor mass (Note1)	kg (lbs)	0.37 (0.81)	0.6 (1.32)	0.78 (1.72)	1.36 (3.0)
Allowable thrust load	N (lbs)	10 (2.25)	20 (4.5)	20 (4.5)	20 (4.5)
Allowable radial load (Note2)	N (lbs)	35 (8.75)	80 (18)	80 (18)	80 (18)

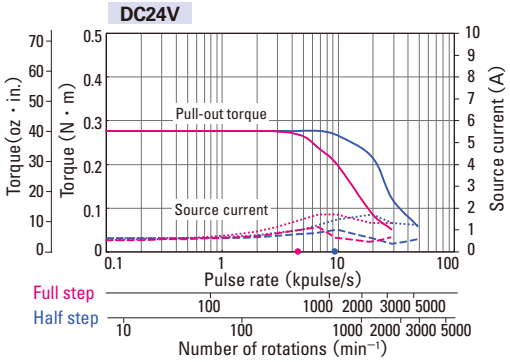
(Note1) Driver mass ▶ P.79
(Note2) When load is applied at 1/3 length from output shaft edge.

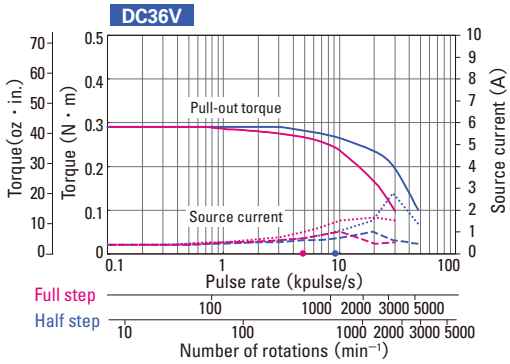
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

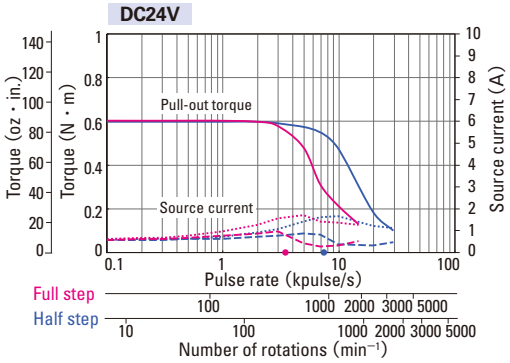
Pull-out torque Full step Half step
Source current (no load) Full step Half step
fs : Maximum self-start frequency when not loaded Full step Half step
Source current (load applied) Full step Half step

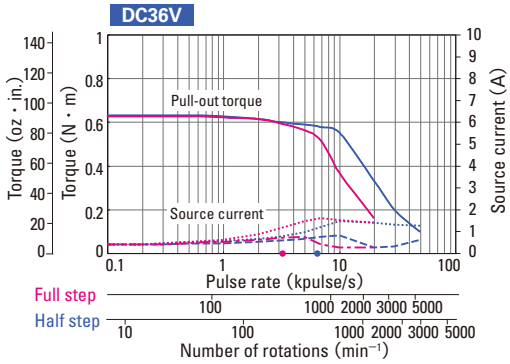
FDF554S FDF554D



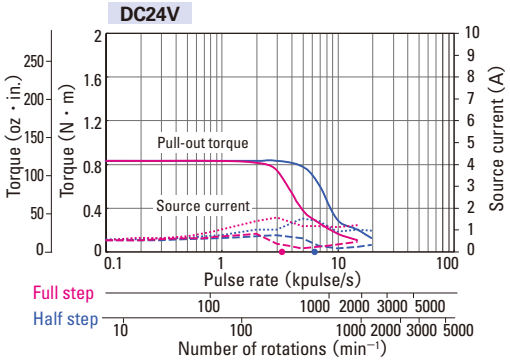


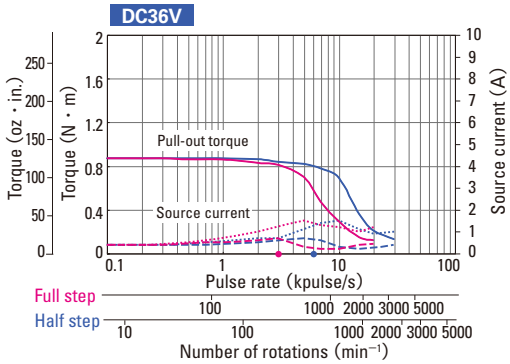
FDF781S FDF781D



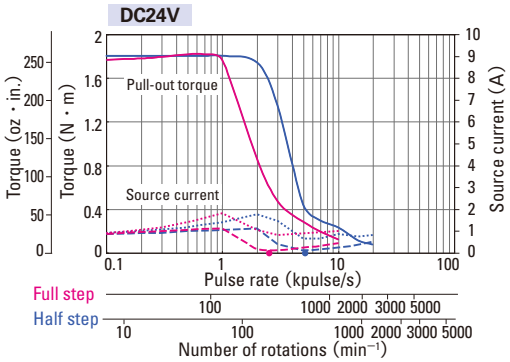


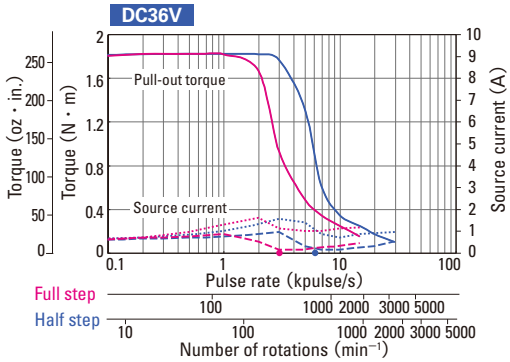
FDF782S FDF782D





FDF783S FDF783D





System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.97 to 100 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size		φ86mm (φ3.39inch)	
Motor length		62.15mm (2.47inch)	92.2mm (3.63inch)
Single shaft	Set ordering model no.	FDF851S	FDF852S
	Corresponding motor model number	103F8581-8241	103F8582-8241
Double shaft	Set ordering model no.	FDF851D	FDF852D
	Corresponding motor model number	103F8581-8211	103F8582-8211
Holding torque	N · m (OZ · in)	2 (283.2)	4.02 (569.3)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	1.45 (7.93)	2.9 (15.86)
Motor mass (Note1)	kg (lbs)	1.5 (3.3)	2.5 (5.5)
Allowable thrust load	N (lbs)	60 (13.5)	60 (13.5)
Allowable radial load (Note2)	N (lbs)	220 (49.5)	220 (49.5)

(Note1) Driver mass ▶ P.79
(Note2) When load is applied at 1/3 length from output shaft edge.

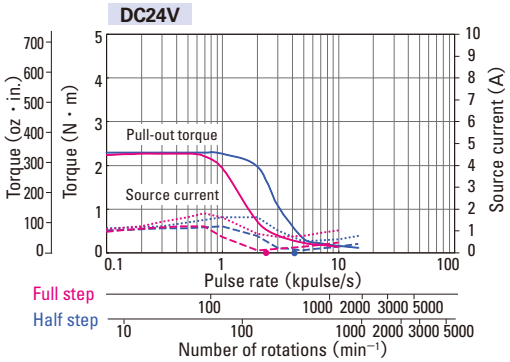
Characteristics

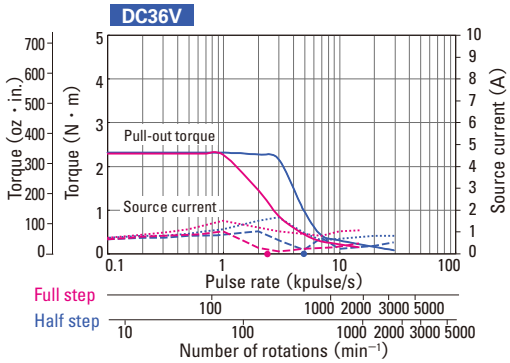
Operating current : 1.4A/phase
Use the rubber coupling

Pull-out torque Full step ——— Half step ———
Source current (no load) Full step - - - Half step - - -

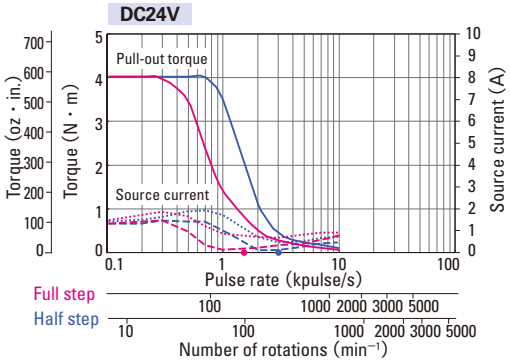
fs : Maximum self-start frequency when not loaded Full step ● Half step ●
Source current (load applied) Full step ····· Half step ·····

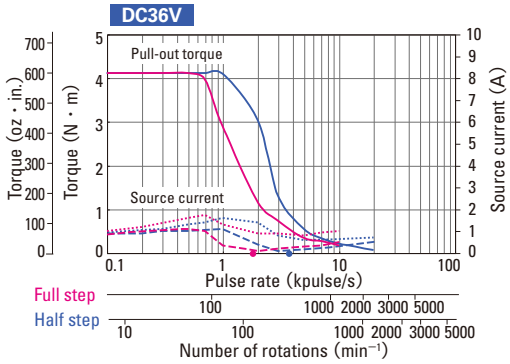
FDF851S FDF851D





FDF852S FDF852D





System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.97 to 100 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Low-backlash gear model DC input Driver (Model number : FS1D140P10) + Motor with low-backlash gear

Rated current : 1.4A/phase

Motor size		42mm sq. (1.65inch sq.)			
Motor + gear length		64.5mm (2.54inch)	64.5mm (2.54inch)	64.5mm (2.54inch)	64.5mm (2.54inch)
Single shaft	Set ordering model no.	FDF551S-CX3.6	FDF551S-CX7.2	FDF551S-CX10	FDF551S-CX20
	Corresponding motor model number	103F5505-82CXA4	103F5505-82CXB4	103F5505-82CXE4	103F5505-82CXG4
Double shaft	Set ordering model no.	FDF551D-CX3.6	FDF551D-CX7.2	FDF551D-CX10	FDF551D-CX20
	Corresponding motor model number	103F5505-82CXA1	103F5505-82CXB1	103F5505-82CXE1	103F5505-82CXG1
Allowable torque	N · m (OZ · in)	0.343 (48.6)	0.686 (97.1)	0.98 (138.8)	1.47 (208.2)
Rotor inertia	X 10^{-4}kg · m² (OZ · in²)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)
Basic step angle	DEG	0.2	0.1	0.072	0.036
Gear ratio	-	1 : 3.6	1 : 7.2	1 : 10	1 : 20
Backlash	DEG	0.6	0.4	0.35	0.25
Allowable speed	min^{-1}	500	250	180	90
Motor mass (Note1)	kg (lbs)	0.36 (0.79)	0.36 (0.79)	0.36 (0.79)	0.36 (0.79)
Allowable thrust load	N (lbs)	15 (3.38)	15 (3.38)	15 (3.38)	15 (3.38)
Allowable radial load (Note2)	N (lbs)	20 (4.5)	20 (4.5)	20 (4.5)	20 (4.5)

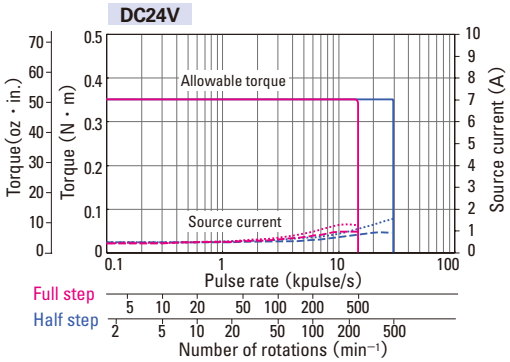
Directions of motor rotation and gear output shaft are the same for models with reduction ratio 1 : 3.6, 1 : 7.2 and 1 : 10 opposite for reduction ratio 1 : 20, 1 : 30, and 1 : 36.
(Note1) Driver mass ▶ P.79
(Note2) When load is applied at 1/3 length from output shaft edge.

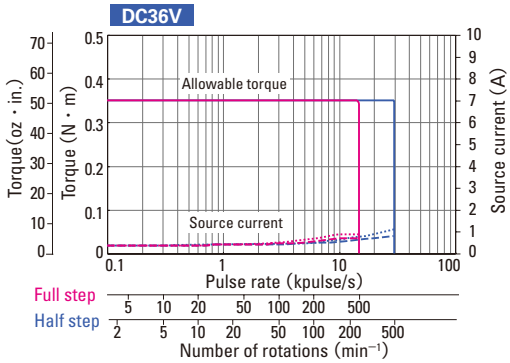
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

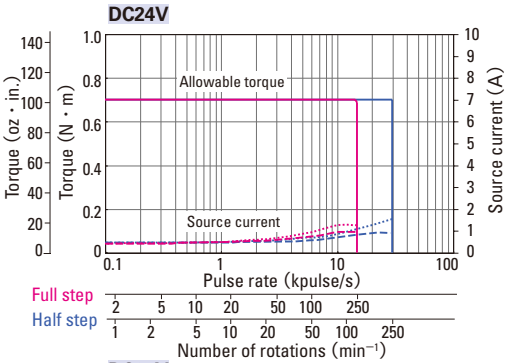
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

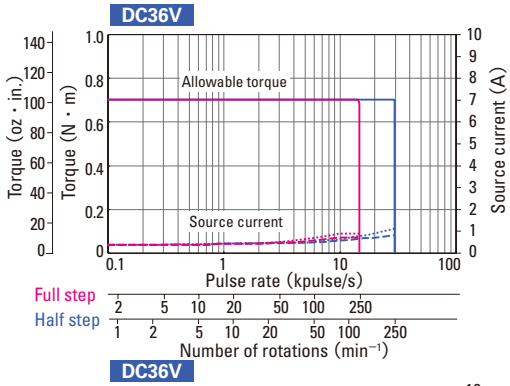
FDF551S-CX3.6 FDF551D-CX3.6



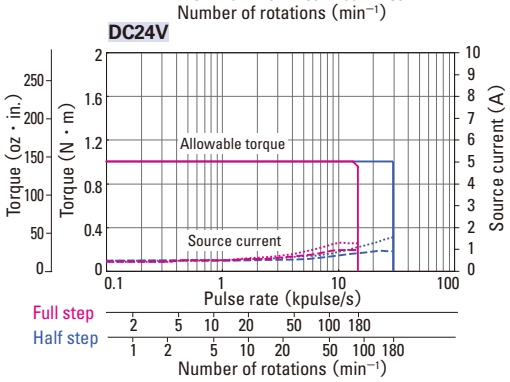


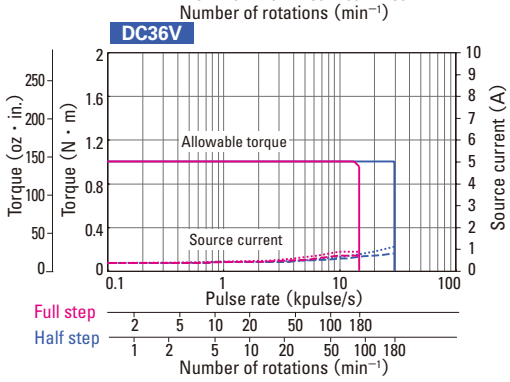
FDF551S-CX7.2 FDF551D-CX7.2



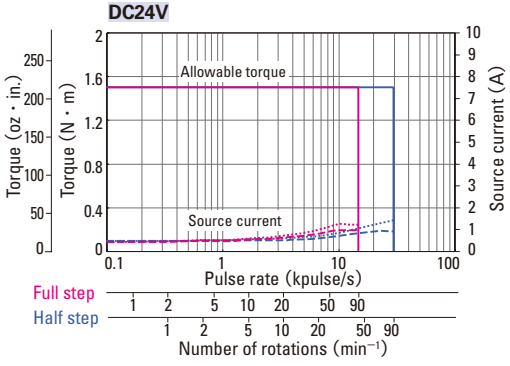


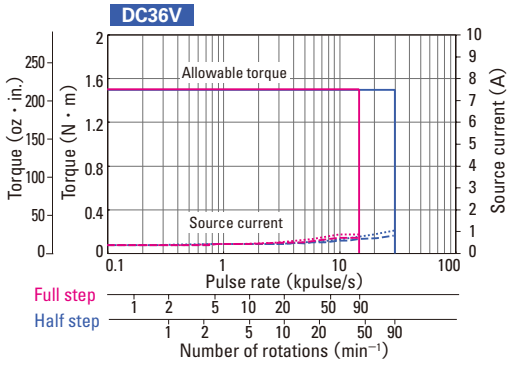
FDF551S-CX10 FDF551D-CX10





FDF551S-CX20 FDF551D-CX20





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size		42mm sq. (1.65inch sq.)		60mm sq. (2.36inch sq.)	
Motor + gear length		64.5mm (2.54inch)	64.5mm (2.54inch)	92mm (3.62inch)	92mm (3.62nch)
Single shaft	Set ordering model no.	FDF551S-CX30	FDF551S-CX36	FDF781S-CX3.6	FDF781S-CX7.2
	Corresponding motor model number	103F5505-82CXJ4	103F5505-82CXK4	103F7851-82CXA4	103F7851-82CXB4
Double shaft	Set ordering model no.	FDF551D-CX30	FDF551D-CX36	FDF781D-CX3.6	FDF781D-CX7.2
	Corresponding motor model number	103F5505-82CXJ1	103F5505-82CXK1	103F7851-82CXA1	103F7851-82CXB1
Allowable torque	N · m (OZ · in)	1.47 (208.2)	1.47 (208.2)	1.25 (177.0)	2.5 (354.0)
Rotor inertia	X 10^{-4}kg · m² (OZ · in²)	0.03 (0.16)	0.03 (0.16)	0.275 (1.5)	0.275 (1.5)
Basic step angle	DEG	0.024	0.02	0.2	0.1
Gear ratio	-	1 : 30	1 : 36	1 : 3.6	1 : 7.2
Backlash	DEG	0.25	0.25	0.55	0.25
Allowable speed	min^{-1}	60	50	500	250
Motor mass (Note1)	kg (lbs)	0.36 (0.79)	0.36 (0.79)	0.97 (2.13)	0.97 (2.13)
Allowable thrust load	N (lbs)	15 (3.38)	15 (3.38)	30 (6.75)	30 (6.75)
Allowable radial load (Note2)	N (lbs)	20 (4.5)	20 (4.5)	100 (22.5)	100 (22.5)

The directions of motor rotation and gear output axle rotation for 42 mm models are the same for 1:3.6, 1:7.2 and 1:10 reduction ratios, and opposite for 1:20, 1:30 and 1:36 reduction ratios.
For 60 mm models, rotation directions are the same for 1:3.6 and 1:7.2 reduction ratios, and opposite for 1:10, 1:20, 1:30 and 1:36 reduction ratios.

(Note1) Driver mass ▶ P.79

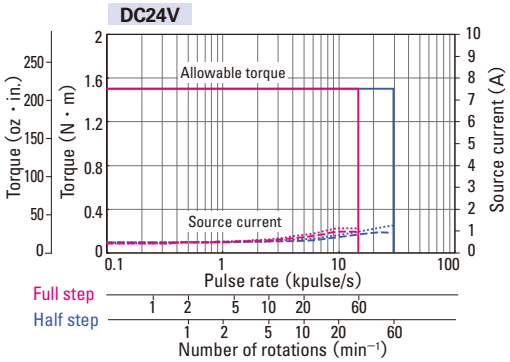
(Note2) When load is applied at 1/3 length from output shaft edge.

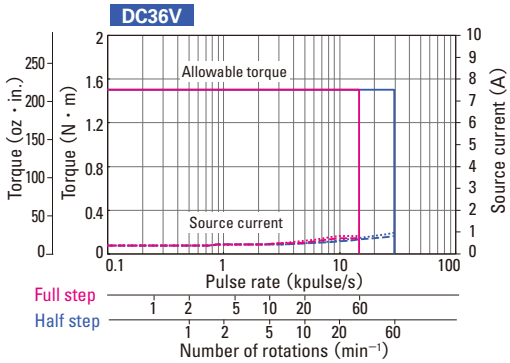
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

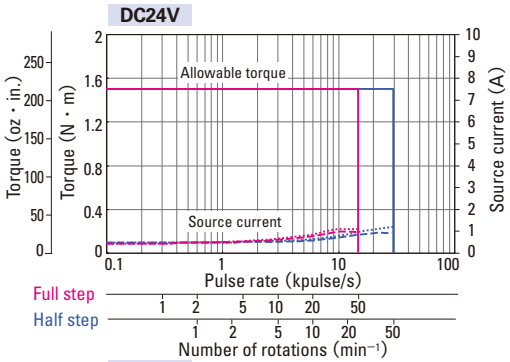
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

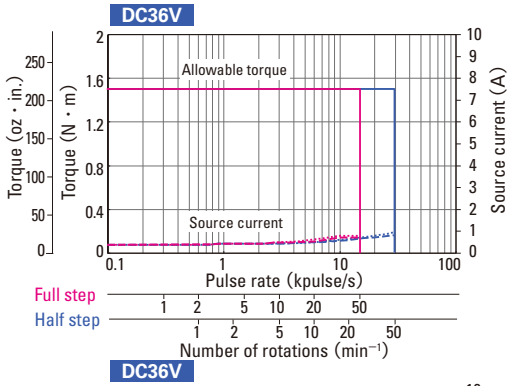
FDF551S-CX30 FDF551D-CX30



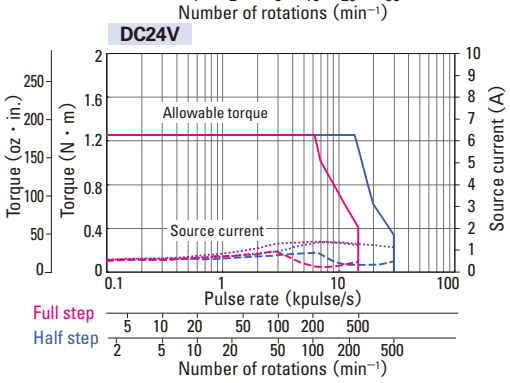


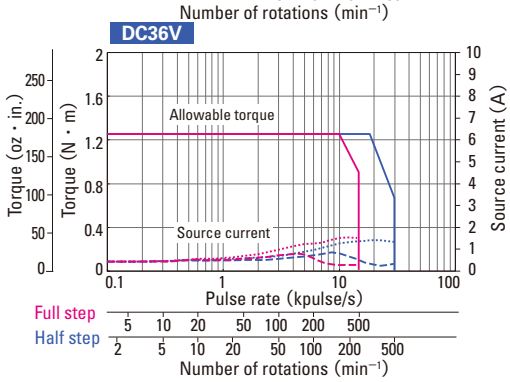
FDF551S-CX36 FDF551D-CX36



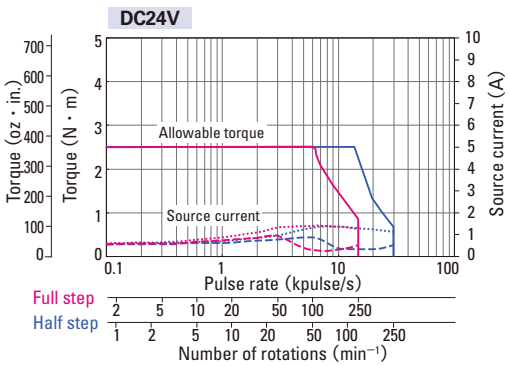


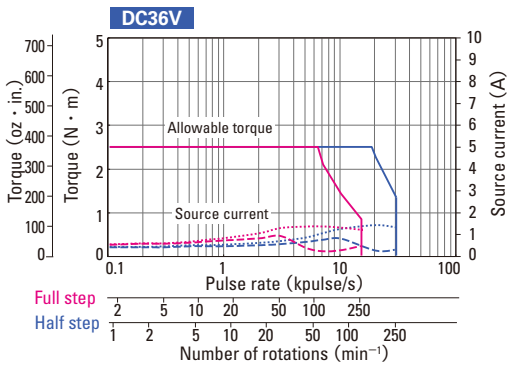
FDF781S-CX3.6 FDF781D-CX3.6





FDF781S-CX7.2 FDF781D-CX7.2





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Low-backlash gear model DC input Driver (Model number : FS1D140P10) + Motor with low-backlash gear

Rated current : 1.4A/phase

Motor size			60mm sq. (2.36inch sq.)			
Motor + gear length			92mm (3.62inch)	92mm (3.62inch)	92mm (3.62inch)	92mm (3.62inch)
Single shaft	Set ordering model no.		FDF781S-CX10	FDF781S-CX20	FDF781S-CX30	FDF781S-CX36
	Corresponding motor model number		103F7851-82CXE4	103F7851-82CXG4	103F7851-82CXJ4	103F7851-82CXK4
Double shaft	Set ordering model no.		FDF781D-CX10	FDF781D-CX20	FDF781D-CX30	FDF781D-CX36
	Corresponding motor model number		103F7851-82CXE1	103F7851-82CXG1	103F7851-82CXJ1	103F7851-82CXK1
Allowable torque		N · m (OZ · in)	3 (424.8)	3.5 (495.6)	4 (566.4)	4 (566.4)
Rotor inertia		X 10^{-4}kg · m² (OZ · in²)	0.275 (1.5)	0.275 (1.5)	0.275 (1.5)	0.275 (1.5)
Basic step angle		DEG	0.072	0.036	0.024	0.02
Gear ratio		-	1 : 10	1 : 20	1 : 30	1 : 36
Backlash		DEG	0.25	0.17	0.17	0.17
Allowable speed		min^{-1}	180	90	60	50
Motor mass (Note1)		kg (lbs)	0.97 (2.13)	0.97 (2.13)	0.97 (2.13)	0.97 (2.13)
Allowable thrust load		N (lbs)	30 (6.75)	30 (6.75)	30 (6.75)	30 (6.75)
Allowable radial load (Note2)		N (lbs)	100 (22.5)	100 (22.5)	100 (22.5)	100 (22.5)

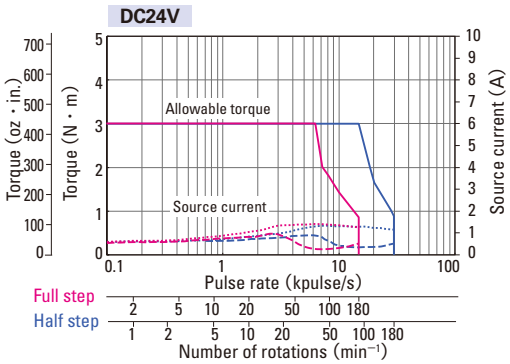
The directions of motor rotation and gear output axle rotation are the same for models with reduction ratio 1:3.6 and 1:7.2 reduction ratios, and opposite for 1:10, 1:20, 1:30 and 1:36 reduction ratios.
(Note1) Driver mass ▶ P.79
(Note2) When load is applied at 1/3 length from output shaft edge.

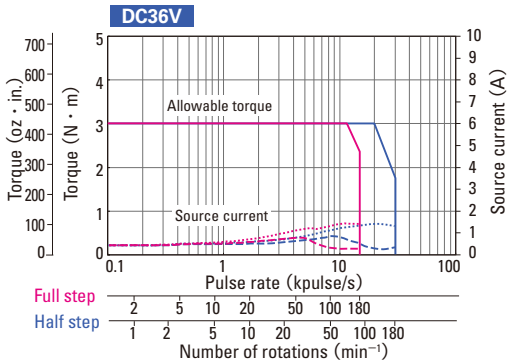
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

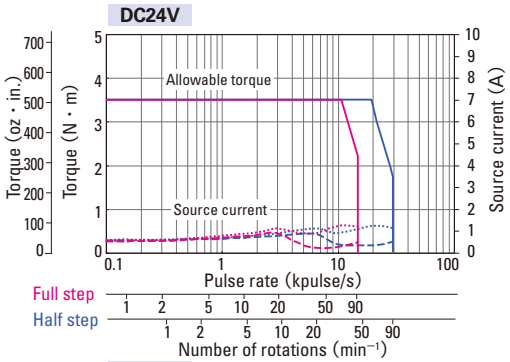
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

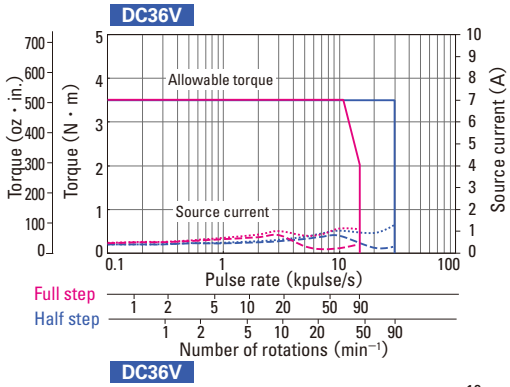
FDF781S-CX10 FDF781D-CX10



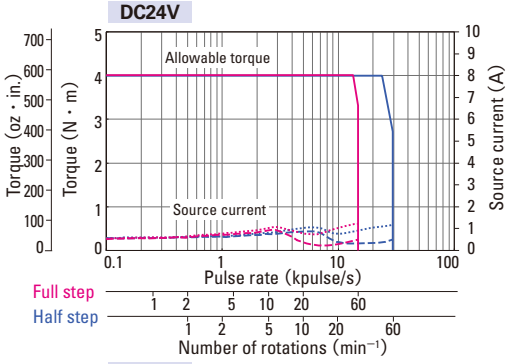


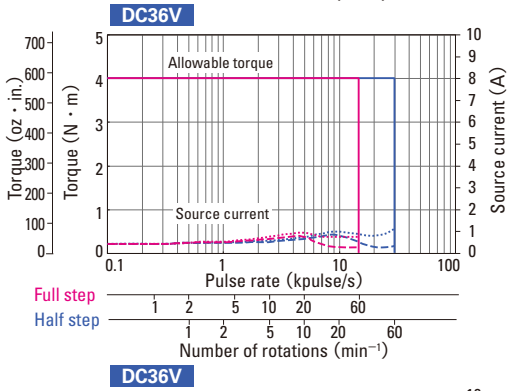
FDF781S-CX20 FDF781D-CX20



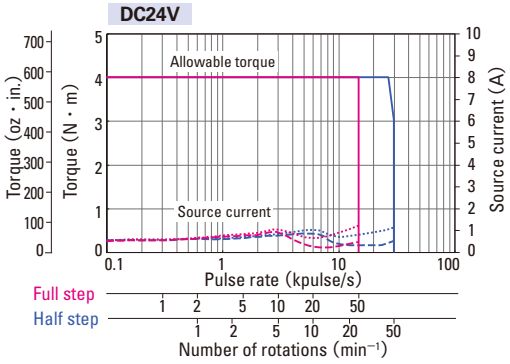


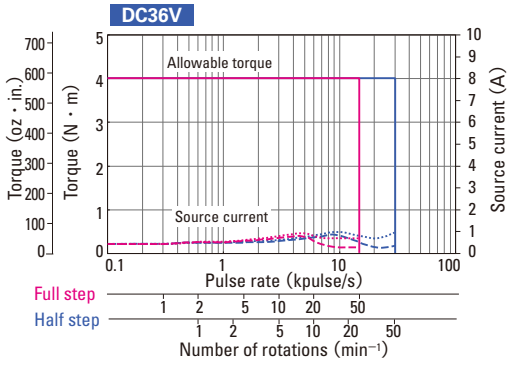
FDF781S-CX30 FDF781D-CX30





FDF781S-CX36 FDF781D-CX36





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size		ϕ86mm (ϕ3.39inch)			
Motor + gear length		127.3mm (5.01inch)	127.3mm (5.01inch)	127.3mm (5.01inch)	127.3mm (5.01inch)
Single shaft	Set ordering model no.	FDF851S-CX3.6	FDF851S-CX7.2	FDF851S-CX10	FDF851S-CX20
	Corresponding motor model number	103F8581-82CXA4	103F8581-82CXB4	103F8581-82CXE4	103F8581-82CXG4
Double shaft	Set ordering model no.	FDF851D-CX3.6	FDF851D-CX7.2	FDF851D-CX10	FDF851D-CX20
	Corresponding motor model number	103F8581-82CXA1	103F8581-82CXB1	103F8581-82CXE1	103F8581-82CXG1
Allowable torque	N · m (OZ · in)	4.5 (637.2)	9 (1274.5)	9 (1274.5)	12 (1699.3)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	1.45 (7.93)	1.45 (7.93)	1.45 (7.93)	1.45 (7.93)
Basic step angle	DEG	0.2	0.1	0.072	0.036
Gear ratio	-	1 : 3.6	1 : 7.2	1 : 10	1 : 20
Backlash	DEG	0.35	0.22	0.22	0.15
Allowable speed	min^{-1}	500	250	180	90
Motor mass (Note1)	kg (lbs)	2.7 (5.94)	2.7 (5.94)	2.7 (5.94)	2.7 (5.94)
Allowable thrust load	N (lbs)	60 (13.5)	60 (13.5)	60 (13.5)	60 (13.5)
Allowable radial load (Note2)	N (lbs)	300 (67.5)	300 (67.5)	300 (67.5)	300 (67.5)

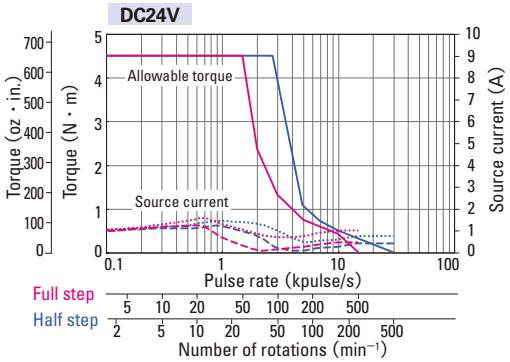
The directions of motor rotation and gear output axle rotation are the same for models with reduction ratio 1:3.6 and 1:7.2 reduction ratios, and opposite for 1:10, 1:20, 1:30 and 1:36 reduction ratios.
(Note1) Driver mass ▶ P.79
(Note2) When load is applied at 1/3 length from output shaft edge.

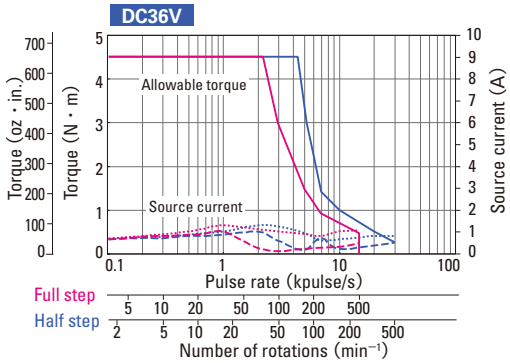
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

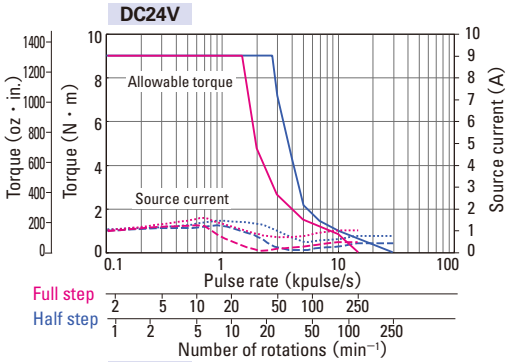
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

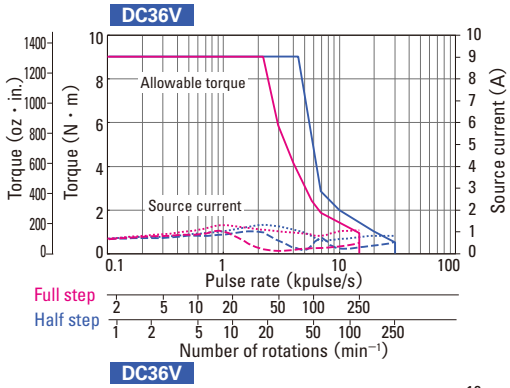
FDF851S-CX3.6 FDF851D-CX3.6



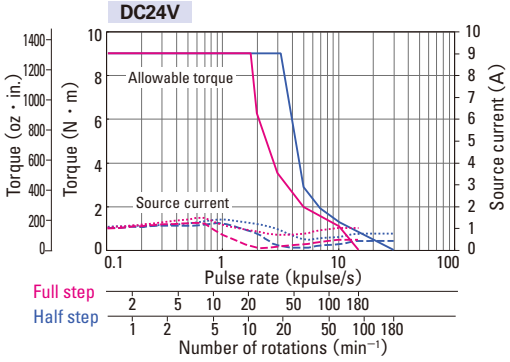


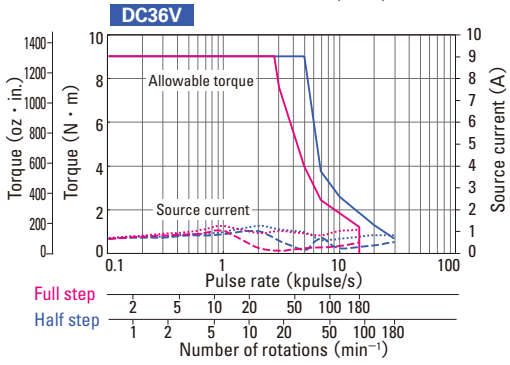
FDF851S-CX7.2 FDF851D-CX7.2



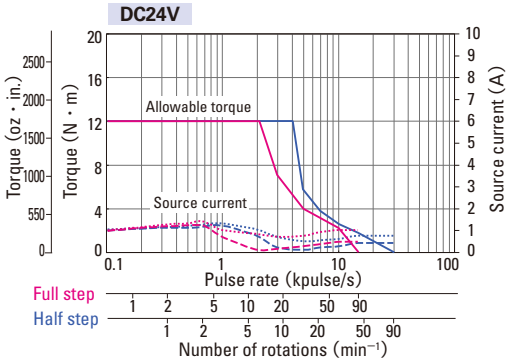


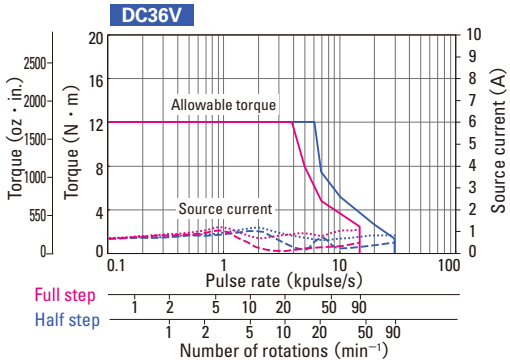
FDF851S-CX10 FDF851D-CX10





FDF851S-CX20 FDF851D-CX20





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Low-backlash gear model DC input Driver (Model number : FS1D140P10) + Motor with low-backlash gear

Rated current : 1.4A/phase

Motor size			⌀86mm (⌀3.39inch)	
Motor + gear length			127.3mm (5.01inch)	127.3mm (5.01inch)
Single shaft	Set ordering model no.		FDF851S-CX30	FDF851S-CX36
	Corresponding motor model number		103F8581-82CXJ4	103F8581-82CXK4
Double shaft	Set ordering model no.		FDF851D-CX30	FDF851D-CX36
	Corresponding motor model number		103F8581-82CXJ1	103F8581-82CXK1
Allowable torque		N · m (OZ · in)	12 (1699.3)	12 (1699.3)
Rotor inertia		X 10^{-4}kg · m² (OZ · in²)	1.45 (7.93)	1.45 (7.93)
Basic step angle		DEG	0.024	0.02
Gear ratio		-	1 : 30	1 : 36
Backlash		DEG	0.15	0.15
Allowable speed		min^{-1}	60	50
Motor mass (Note1)		kg (lbs)	2.7 (5.94)	2.7 (5.94)
Allowable thrust load		N (lbs)	60 (13.5)	60 (13.5)
Allowable radial load (Note2)		N (lbs)	300 (67.5)	300 (67.5)

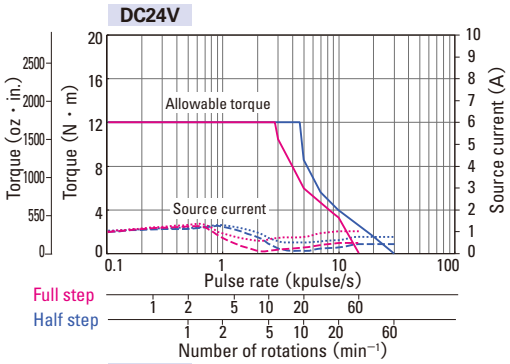
The directions of motor rotation and gear output axle rotation are the same for models with reduction ratio 1:3.6 and 1:7.2 reduction ratios, and opposite for 1:10, 1:20, 1:30 and 1:36 reduction ratios.
(Note1) Driver mass ▶ P.79
(Note2) When load is applied at 1/3 length from output shaft edge.

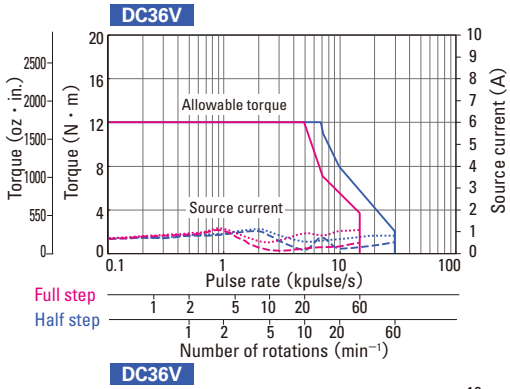
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

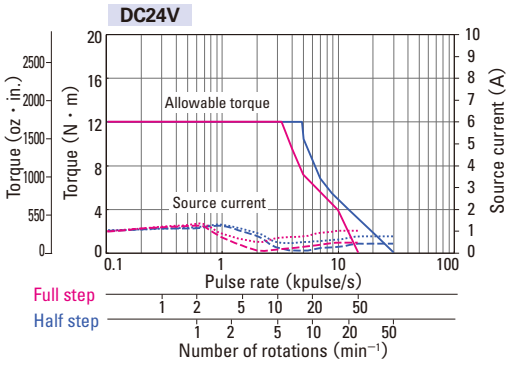
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

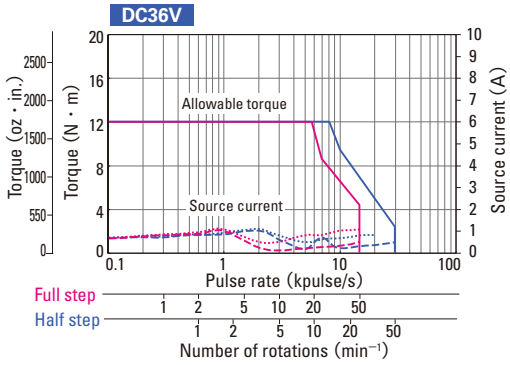
FDF851S-CX30 FDF851D-CX30





FDF851S-CX36 FDF851D-CX36





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.
System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.101 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Spur gear model DC input Driver (Model number : FS1D140P10) + Motor with spur gear

Rated current : 0.75A/phase

Motor size		28mm sq. (1.10inch sq.)			
Motor + gear length		61.5mm (2.42inch)	61.5mm (2.42inch)	61.5mm (2.42inch)	61.5mm (2.42inch)
Single shaft	Set ordering model no.	FDF521S-GX3.6	FDF521S-GX7.2	FDF521S-GX10	FDF521S-GX20
	Corresponding motor model number	SH5281-72GXA4	SH5281-72GXB4	SH5281-72GXE4	SH5281-72GXG4
Double shaft	Set ordering model no.	FDF521D-GX3.6	FDF521D-GX7.2	FDF521D-GX10	FDF521D-GX20
	Corresponding motor model number	SH5281-72GXA1	SH5281-72GXB1	SH5281-72GXE1	SH5281-72GXG1
Allowable torque	N · m (OZ · in)	0.1 (14.16)	0.15 (21.24)	0.2 (28.32)	0.35 (49.6)
Rotor inertia	X 10^{-4}kg · m² (OZ · in²)	0.01 (0.05)	0.01 (0.05)	0.01 (0.05)	0.01 (0.05)
Basic step angle	DEG	0.2	0.1	0.072	0.036
Gear ratio	-	1 : 3.6	1 : 7.2	1 : 10	1 : 20
Backlash	DEG	2	2	2	1.5
Allowable speed	min^{-1}	800	400	300	150
Motor mass (Note1)	kg (lbs)	0.17 (0.37)	0.17 (0.37)	0.17 (0.37)	0.17 (0.37)
Allowable thrust load	N (lbs)	10 (2.25)	10 (2.25)	10 (2.25)	10 (2.25)
Allowable radial load (Note2)	N (lbs)	15 (3.38)	15 (3.38)	15 (3.38)	15 (3.38)

The directions of motor rotation and gear output axle rotation are the same for models with reduction ratio 1:3.6, 1:7.2, 1:20, 1:30 and 1:50 reduction ratios, and opposite for 1:10 reduction ratios.

(Note1) Driver mass ▶ P.79

(Note2) When load is applied at 1/3 length from output shaft edge.

Characteristics

Operating current : 0.75A/phase

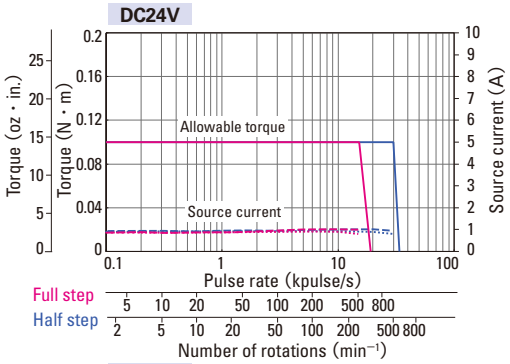
Use the rubber coupling

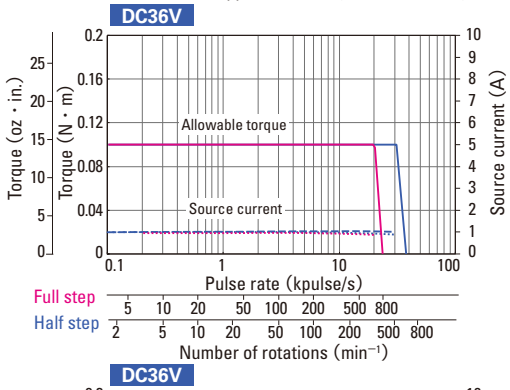
Allowable torque Full step Half step

Source current (no load) Full step Half step

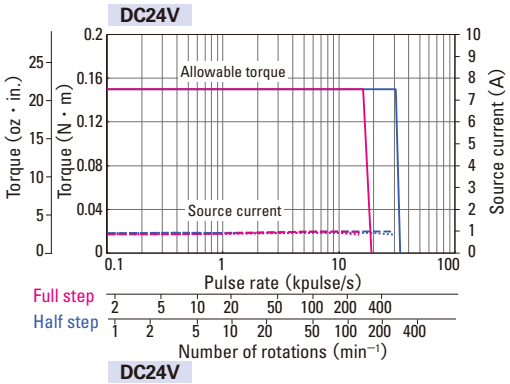
Source current (load applied) Full step Half step

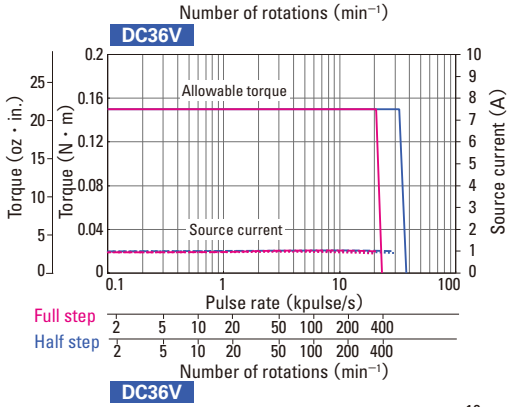
FDF521S-GX3.6 FDF521D-GX3.6



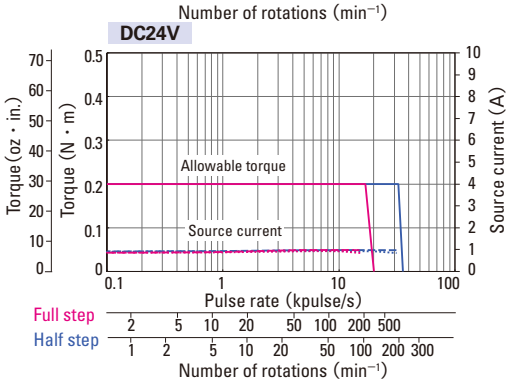


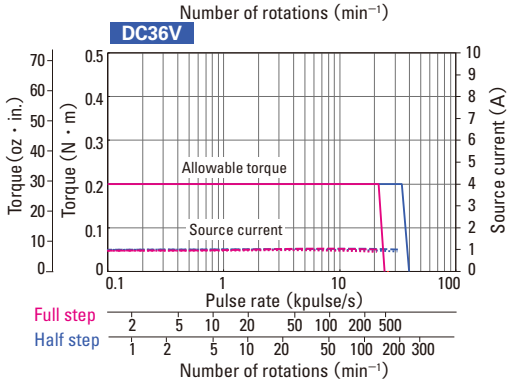
FDF521S-GX7.2 FDF521D-GX7.2



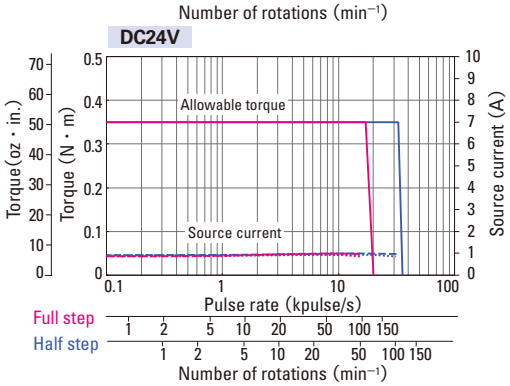


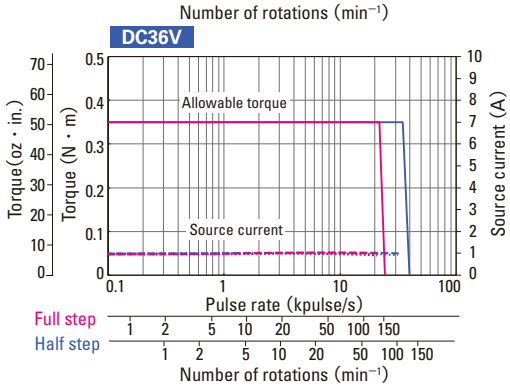
FDF521S-GX10 FDF521D-GX10





FDF521S-GX20 FDF521D-GX20





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.

System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.102 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Spur gear model DC input Driver (Model number : FS1D140P10) + Motor with spur gear

Rated current : 0.75A/phase

Motor size			28mm sq. (1.10inch sq.)	
Motor + gear length			61.5mm (2.42inch)	61.5mm (2.42inch)
Single shaft	Set ordering model no.		FDF521S-GX30	FDF521S-GX50
	Corresponding motor model number		SH5281-72GXJ4	SH5281-72GXL4
Double shaft	Set ordering model no.		FDF521D-GX30	FDF521D-GX50
	Corresponding motor model number		SH5281-72GXJ1	SH5281-72GXL1
Allowable torque		N · m (OZ · in)	0.5 (70.80)	0.5 (70.80)
Rotor inertia		X 10^{-4}kg · m² (OZ · in²)	0.01 (0.05)	0.01 (0.05)
Basic step angle		DEG	0.024	0.0144
Gear ratio		-	1 : 30	1 : 50
Backlash		DEG	1.5	1.5
Allowable speed		min^{-1}	100	60
Motor mass (Note1)		kg (lbs)	0.17 (0.37)	0.17 (0.37)
Allowable thrust load		N (lbs)	10 (2.25)	10 (2.25)
Allowable radial load (Note2)		N (lbs)	15 (3.38)	15 (3.38)

The directions of motor rotation and gear output axle rotation are the same for models with reduction ratio 1:3.6, 1:7.2, 1:20, 1:30 and 1:50 reduction ratios, and opposite for 1:10 reduction ratios.
(Note1) Driver mass ▶ P.79
(Note2) When load is applied at 1/3 length from output shaft edge.

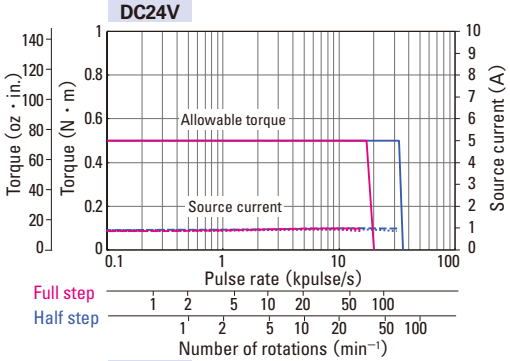
Characteristics

Operating current : 0.75A/phase
Use the rubber coupling

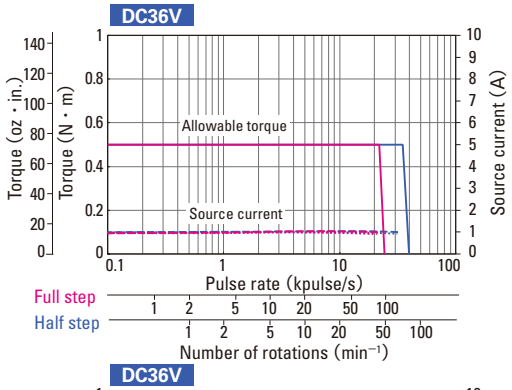
Allowable torque Full step Half step
Source current (no load) Full step Half step
Source current (load applied) Full step Half step

FDF521S-GX30
FDF521D-GX30

DC24V

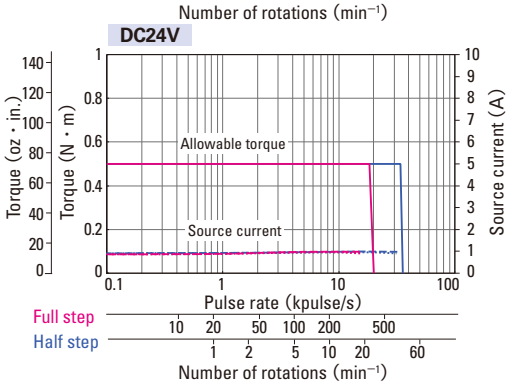


DC36V

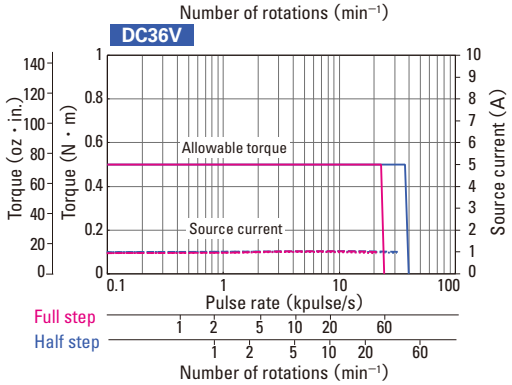


FDF521S-GX50
FDF521D-GX50

DC24V



DC36V



In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its allowable torque will not be exceeded.

System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.102 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Harmonic gear model DC input Driver (Model number : FS1D140P10) + Harmonic gear motor

Rated current : 28mm sq.(1.10inch sq.) Motor 0.75A/phase, 42mm sq. (1.65inch sq.) to ϕ86mm (ϕ3.39inch) Motor 1.4A/phase

Motor size		28mm sq. (1.10inch sq.)		42mm sq. (1.65inch sq.)	
Motor + gear length		70.7mm (2.78inch)	70.7mm (2.78inch)	73.5 mm (2.78inch)	73.5 mm (2.78inch)
Single shaft	Set ordering model no.	FDF521S-HX50	FDF521S-HX100	FDF551S-HX30	FDF551S-HX50
	Corresponding motor model number	SH5281-72HXL4	SH5281-72HXM4	103F5505-82HXJ5	103F5505-82HXL5
Double shaft	Set ordering model no.	FDF521D-HX50	FDF521D-HX100	FDF551D-HX30	FDF551D-HX50
	Corresponding motor model number	SH5281-72HXL1	SH5281-72HXM1	103F5505-82HXJ2	103F5505-82HXL2
Allowable torque	N · m (OZ · in)	1.5 (212.4)	2 (283.2)	2.2 (311.547)	3.5 (495.643)
Momentary allowable torque	N · m (OZ · in)	2.7 (382.4)	3.6 (509.8)	4.5 (637.3)	8.3 (1175.4)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	0.013 (0.066)	0.013 (0.066)	0.042 (0.23)	0.042 (0.23)
Basic step angle	DEG	0.0144	0.0072	0.024	0.0144
Gear ratio	-	1 : 50	1 : 100	1 : 30	1 : 50
Hysteresis loss	Minute	-	-	3.6	2.4
Lost motion	Minute	0.4 to 3 ± 0.06N · m (0.85oz · in)	0.4 to 3 ± 0.08N · m(1.133oz · in)	-	-
Allowable speed	min^{-1}	70	35	116	70
Motor mass (Note1)	kg (lbs)	0.22 (0.48)	0.22 (0.48)	0.43 (0.94)	0.43 (0.94)
Allowable thrust load	N (lbs)	100 (22.5)	100 (22.5)	1150 (258.75)	1150 (258.75)
Allowable radial load (Note2)	N (lbs)	160 (36)	160 (36)	275 (61.88)	275 (61.88)

Direction of gear output shaft are the opposite. (Note1) Driver mass ▶ P.79 (Note2) When load is applied at 1/3 length from output shaft edge.

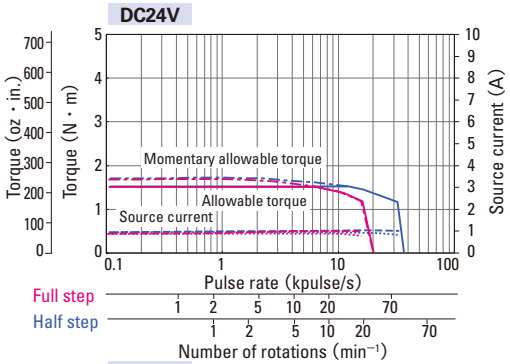
Characteristics

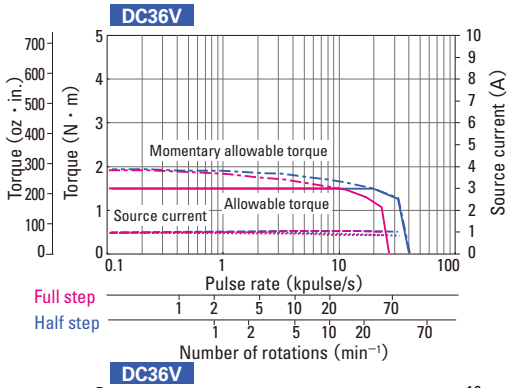
Use the rubber coupling

Momentary allowable torque Full step / Half step — Source current (load applied) Full step / Half step — Allowable torque Full step / Half step — Source current (no load) Full step / Half step

FDF521S-HX50 FDF521D-HX50

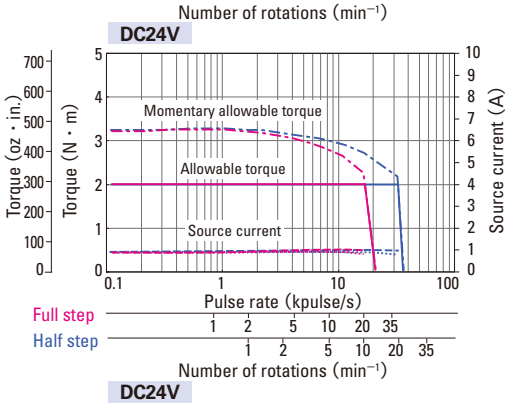
Operating current : 0.75A/phase

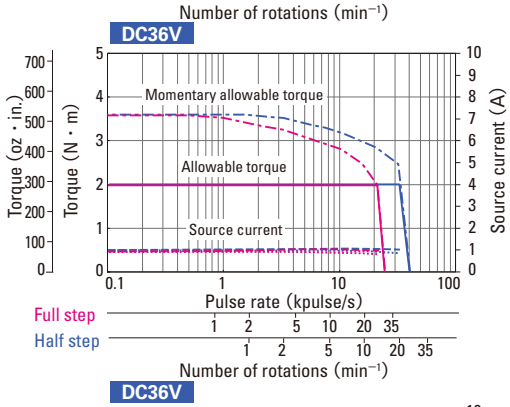




FDF521S-HX100 FDF521D-HX100

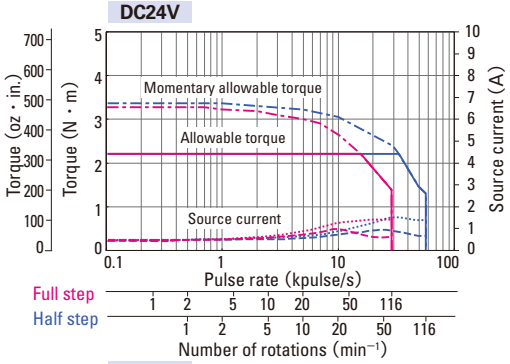
Operating current : 0.75A/phase

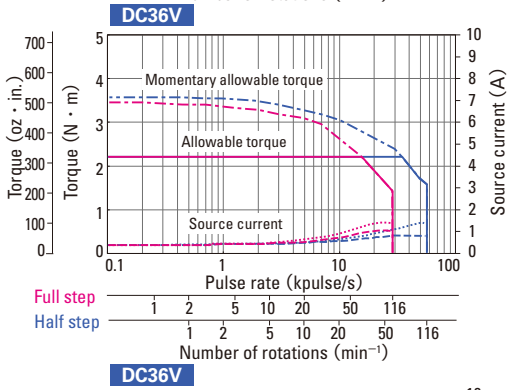




FDF551S-HX30 FDF551D-HX30

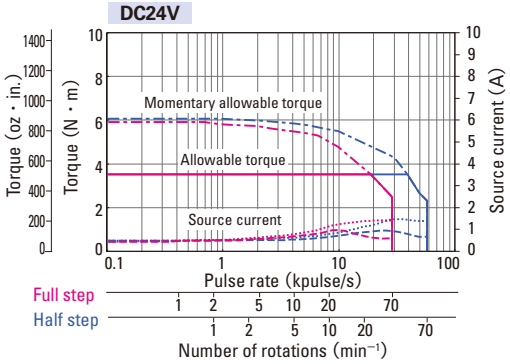
Operating current : 1.4A/phase

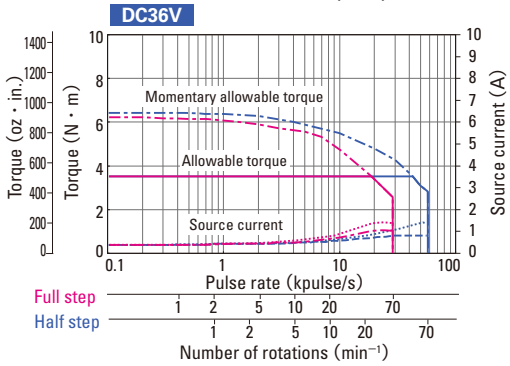




FDF551S-HX50 FDF551D-HX50

Operating current : 1.4A/phase





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its momentary allowable torque will not be exceeded.
System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.102 to 103 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Harmonic gear model DC input Driver (Model number : FS1D140P10) + Harmonic gear motor

Rated current : 28mm sq. (1.10inch sq.) Motor 0.75A/phase, 42mm sq. (1.65inch sq.) to ϕ86mm (ϕ3.39inch) Motor 1.4A/phase

Motor size		42mm sq. (1.65inch sq.)	60mm sq. (2.36inch sq.)		ϕ86mm (ϕ3.39inch)
Motor + gear length		73.5 mm	113.5mm (XXXinch)	113.5mm (XXXinch)	144.15mm (XXXinch)
Single shaft	Set ordering model no.	FDF551S-HX100	FDF781S-HX50	FDF781S-HX100	FDF851S-HX50
	Corresponding motor model number	103F5505-82HXM5	103F7851-82HXL4	103F7851-82HXM4	103F8581-82HXL4
Double shaft	Set ordering model no.	FDF551D-HX100	FDF781D-HX50	FDF781D-HX100	FDF851D-HX50
	Corresponding motor model number	103F5505-82HXM2	103F7851-82HXL1	103F7851-82HXM1	103F8581-82HXL1
Allowable torque	N · m (OZ · in)	5 (708.061)	5.5 (778.8)	8 (1132.9)	25 (3540.2)
Momentary allowable torque	N · m (OZ · in)	11 (1557.7)	14 (1982.6)	20 (2832.2)	34 (4814.8)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	0.0042 (0.02)	0.31 (1.695)	0.31 (1.695)	1.65 (9.02)
Basic step angle	DEG	0.0072	0.0144	0.0072	0.0144
Gear ratio	-	1 : 100	1 : 50	1 : 100	1 : 50
Hysteresis loss	Minute	2.4	-	-	-
Lost motion	Minute	-	0.4 to 3 ± 0.28N · m (3.965oz · in)	0.4 to 3 ± 0.4N · m (56.645oz · in)	0.4 to 3 ± 1N · m (141.612oz · in)
Allowable speed	min^{-1}	35	70	35	70
Motor mass (Note1)	kg (lbs)	0.42 (0.92)	1.2 (2.64)	1.2 (2.64)	3.3 (7.26)
Allowable thrust load	N (lbs)	1150 (258.75)	400 (90)	400 (90)	1400 (315)
Allowable radial load (Note2)	N (lbs)	275 (61.88)	360 (81)	360 (81)	1380 (310.5)

Direction of gear output shaft are the opposite. (Note1) Driver mass ▶ P.79 (Note2) When load is applied at 1/3 length from output shaft edge.

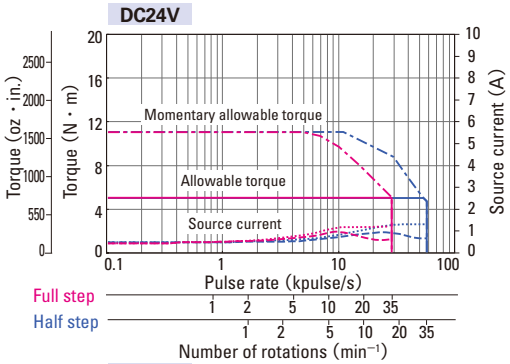
Characteristics

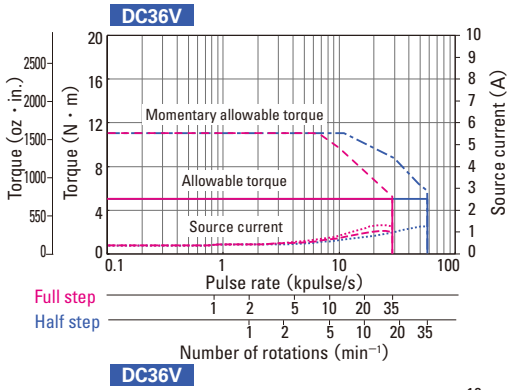
Operating current : 1.4A/phase
Use the rubber coupling

Momentary allowable torque Full step Half step
Source current (load applied) Full step Half step

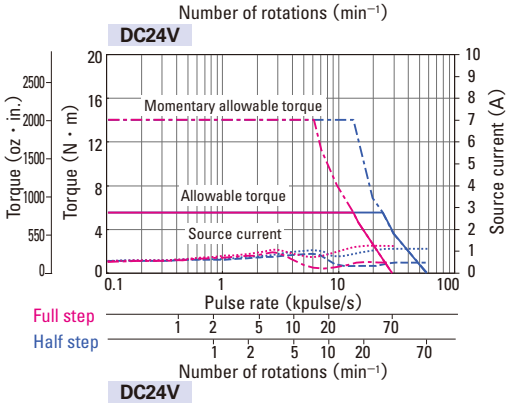
Allowable torque Full step Half step
Source current (no load) Full step Half step

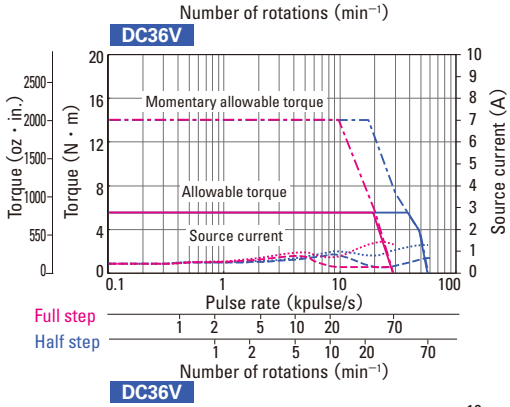
FDF551S-HX100 FDF551D-HX100



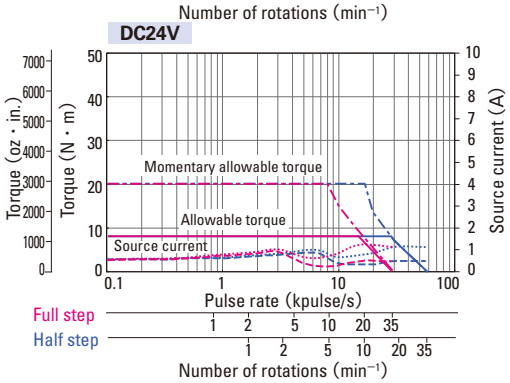


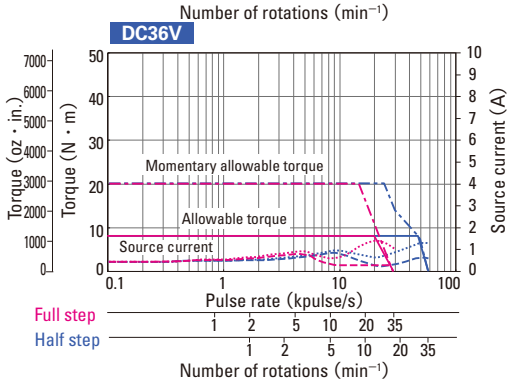
FDF781S-HX50 FDF781D-HX50



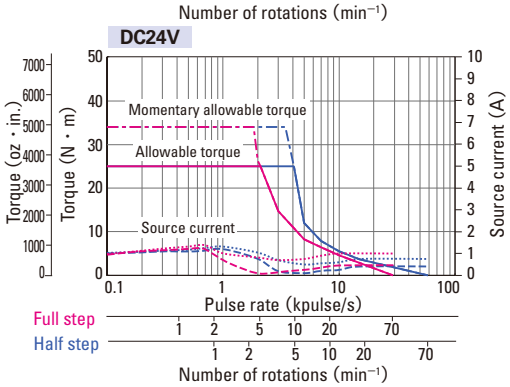


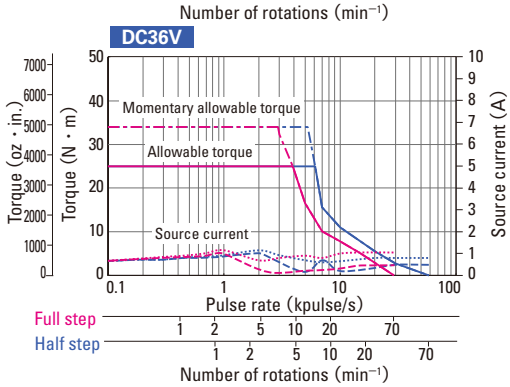
FDF781S-HX100 FDF781D-HX100





FDF851S-HX50 FDF851D-HX50





In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its momentary allowable torque will not be exceeded.
System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.102 to 103 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size		**φ86mm (φ3.39inch)**
Motor + gear length		**144.15mm (5.68inch)**
Single shaft	**Set ordering model no.**	**FDF851S-HX100**
	Corresponding motor model number	103F8581-82HXM4
Double shaft	**Set ordering model no.**	**FDF851D-HX100**
	Corresponding motor model number	103F8581-82HXM1
Allowable torque	N · m (OZ · in)	41 (5805.9)
Momentary allowable torque	N · m (OZ · in)	59 (8355.1)
Rotor inertia	X 10^{-4}kg · m^2 (OZ · in^2)	1.65 (9.02)
Basic step angle	DEG	0.0072
Gear ratio	-	1 : 100
Hysteresis loss	Minute	-
Lost motion	Minute	0.4 to 3 ± 1.2N · m (169.934oz · in)
Allowable speed	min^{-1}	35
Motor mass (Note1)	kg (lbs)	3.3 (7.26)
Allowable thrust load	N (lbs)	1400 (315)
Allowable radial load (Note2)	N (lbs)	1380 (310.5)

Direction of gear output shaft are the opposite. (Note1) Driver mass ▶ P.79 (Note2) When load is applied at 1/3 length from output shaft edge.

Characteristics

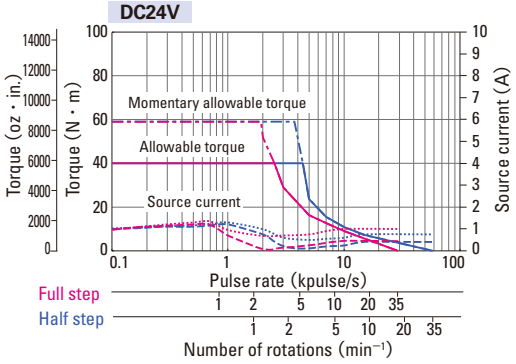
Operating current : 1.4A/phase
Use the rubber coupling

Momentary allowable torque Full step Half step
Source current (load applied) Full step Half step

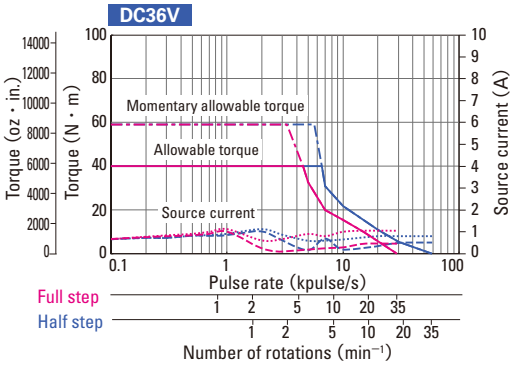
Allowable torque Full step Half step
Source current (no load) Full step Half step

FDF851S-HX100
FDF851D-HX100

DC24V



DC36V



In motor+gear models, the gears may be damaged if allowable torque is exceeded. When selecting a motor, ensure that its momentary allowable torque will not be exceeded.
System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.102 to 103 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Electromagnetic brake model

DC input Driver (Model number : FS1D140P10) + Electromagnetic brake motor

Basic step angle : 0.72° Rated current : 1.4A/phase

Motor size			42mm sq. (1.65inch sq.)			60mm sq. (3.39inch sq.)
Motor + brake length			64.5mm	70.5mm	79.5mm	85.8mm
Set ordering model no.			FDF551S-XB	FDF552S-XB	FDF554S-XB	FDF781S-XB
Corresponding motor model number			103F5505-82XB41	103F5508-82XB41	103F5510-82XB41	103F7851-82XB41
Holding torque		N · m (OZ · in)	0.13 (8.4)	0.18 (25.49)	0.25 (35.4)	0.55 (77.88)
Rotor inertia		X 10^{-4}kg · m^2 (OZ · in^2)	0.045 (0.25)	0.068 (0.37)	0.08 (0.44)	0.43 (2.35)
Motor mass (Note1)		kg (lbs)	0.38 (0.84)	0.43 (0.95)	0.52 (1.14)	0.94 (2.07)
Allowable thrust load		N (lbs)	10 (2.25)	10 (2.25)	10 (2.25)	20 (4.5)
Allowable radial load (Note2)		N (lbs)	35 (8.75)	35 (8.75)	35 (8.75)	80 (18)
Brake type		-	No excitation actuating type	No excitation actuating type	No excitation actuating type	No excitation actuating type
Electromagnetic brake	Power supply input	V	DC24V ± 5%	DC24V ± 5%	DC24V ± 5%	DC24V ± 5%
	Excitation current	A	0.08	0.08	0.08	0.25
	Power consumption	W	2	2	2	6
	Static friction torque	N · m (OZ · in)	0.3 (42.48)	0.3 (42.48)	0.3 (42.48)	0.8 (113.29)
	Brake operating time	ms	20	20	20	20
	Brake release time	ms	30	30	30	30

(Note1) Driver mass ▶ P.79

(Note2) When load is applied at 1/3 length from output shaft edge.

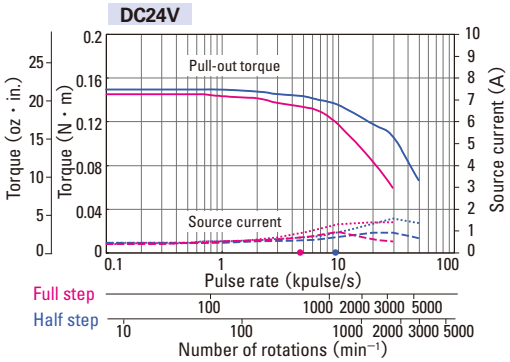
Characteristics

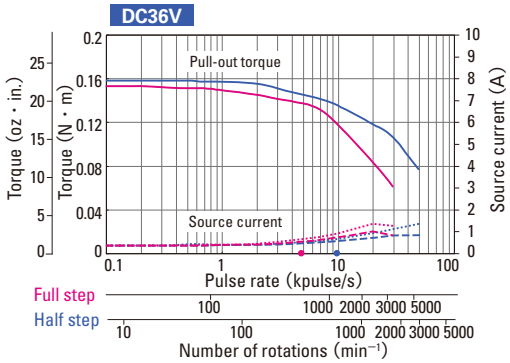
Operating current : 1.4A/phase
Use the rubber coupling

Pull-out torque Full step Half step
Source current (no load) Full step Half step

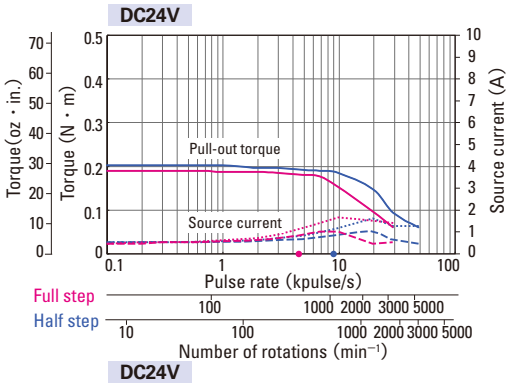
fs : Maximum self-start frequency when not loaded Full step Half step
Source current (load applied) Full step Half step

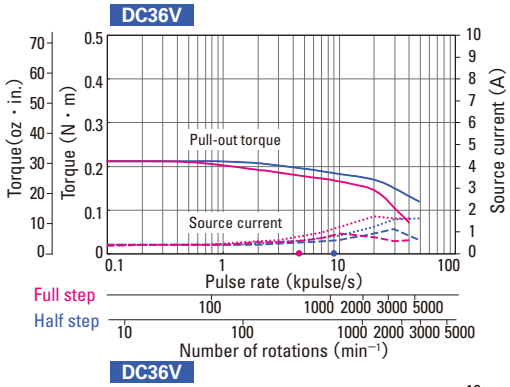
FDF551S-XB



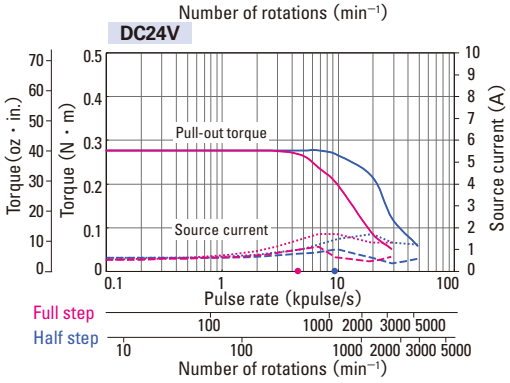


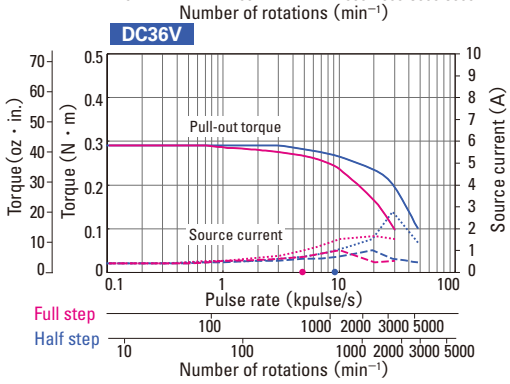
FDF552S-XB



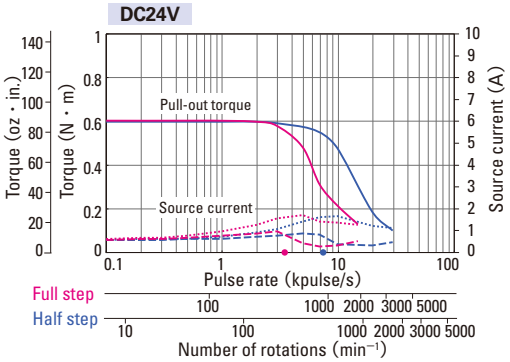


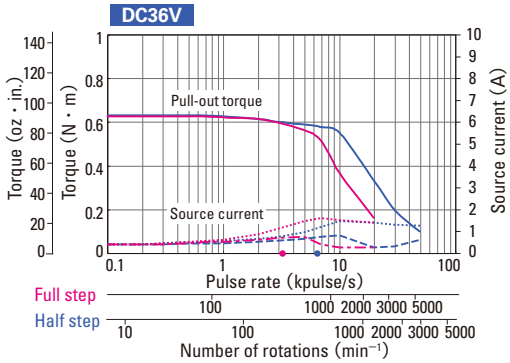
FDF554S-XB





FDF781S-XB





The electromagnetic brake only works when the motor is stopped, and cannot be used for braking.

System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.104 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor size			60mm sq. (2.36inch sq.)		⌀86mm (⌀3.39inch)	
Motor + brake length			94.5mm	126.7mm	116.7mm	146.8mm
Set ordering model no.			FDF782S-XB	FDF783S-XB	FDF851S-XB	FDF852S-XB
Corresponding motor model number			103F7852-82XB41	103F7853-82XB41	103F8581-82XB41	103F8582-82XB41
Holding torque		N · m (OZ · in)	0.87 (123.19)	1.67 (236.5)	2 (283.2)	4.02 (569.3)
Rotor inertia		X 10^{-4}kg · m^2 (OZ · in^2)	0.56 (3.06)	1 (5.47)	2.24 (12.25)	3.69 (20.18)
Motor mass (Note1)		kg (lbs)	1.12 (2.46)	1.7 (3.74)	3.5 (7.7)	4.5 (9.9)
Allowable thrust load		N (lbs)	20 (4.5)	20 (4.5)	60 (13.5)	60 (13.5)
Allowable radial load (Note2)		N (lbs)	80 (18)	80 (18)	220 (49.5)	220 (49.5)
Brake type		-	No excitation actuating type	No excitation actuating type	No excitation actuating type	No excitation actuating type
Electromagnetic brake	Power supply input	V	DC24V ± 5%	DC24V ± 5%	DC24V ± 5%	DC24V ± 5%
	Excitation current	A	0.25	0.25	0.42	0.42
	Power consumption	W	6	6	10	10
	Static friction torque	N · m (OZ · in)	0.8 (113.29)	0.8 (113.29)	5 (708.061)	5 (708.061)
	Brake operating time	ms	20	20	20	20
	Brake release time	ms	30	30	50	50

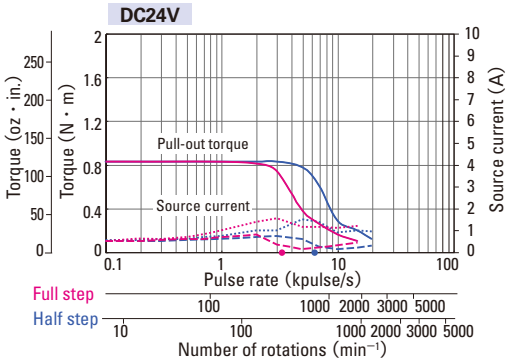
(Note1) Driver mass ▶ P.79
(Note2) When load is applied at 1/3 length from output shaft edge.

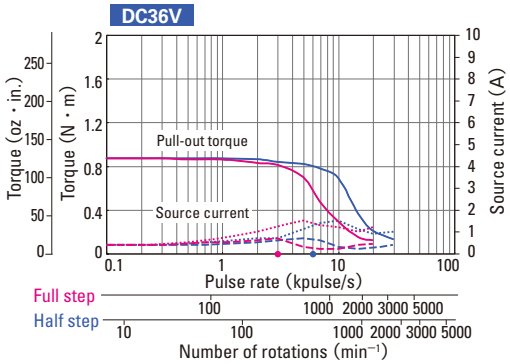
Characteristics

Operating current : 1.4A/phase
Use the rubber coupling

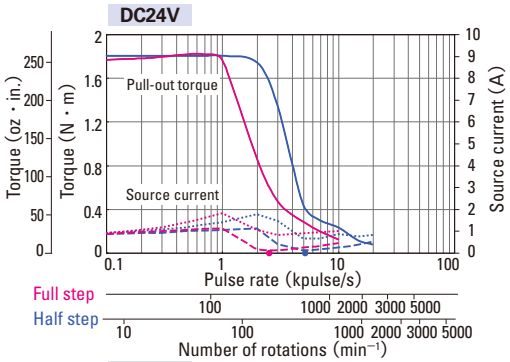
Pull-out torque Full step Half step — Source current (no load) Full step Half step — fs : Maximum self-start frequency when not loaded Full step Half step — Source current (load applied) Full step Half step

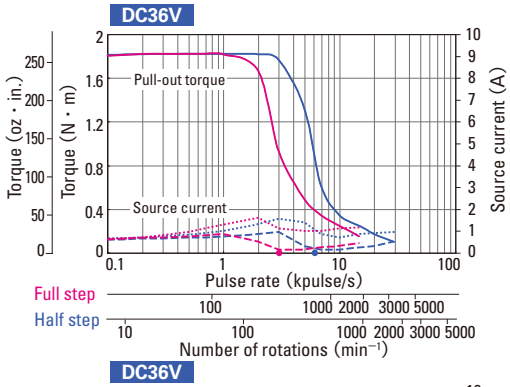
FDF782S-XB



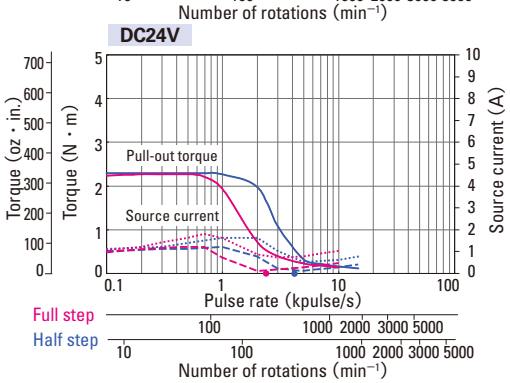


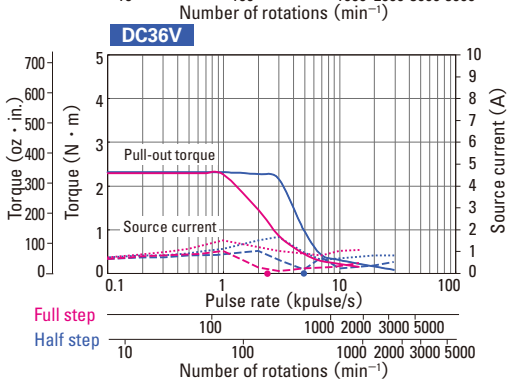
FDF783S-XB



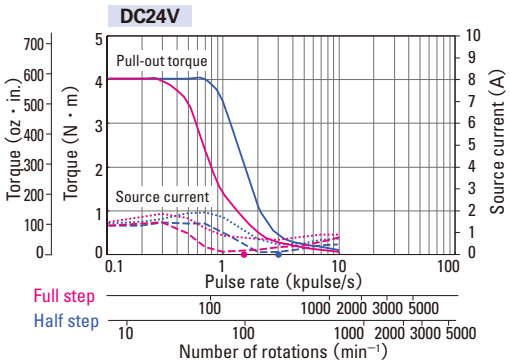


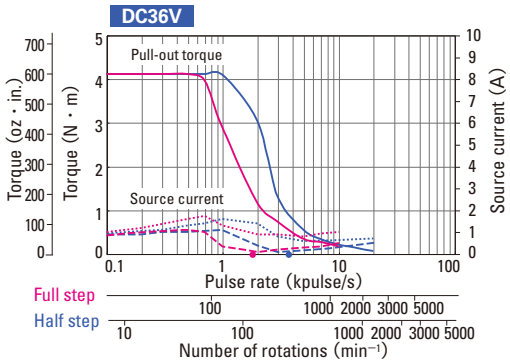
FDF851S-XB





FDF852S-XB





The electromagnetic brake only works when the motor is stopped, and cannot be used for braking.
System configuration ▶ P.60 Set Model Configuration ▶ P.62 Motor dimensions ▶ P.104 Driver dimensions ▶ P.105 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Motor specifications

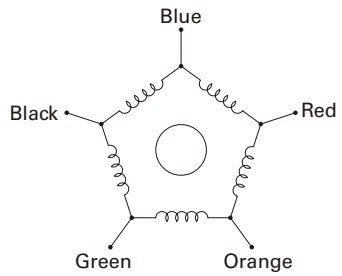
General specifications

Model number	SH528 □	103F55 □□／103F785 □／103F858 □
Ambient operation temperature	− 10 to + 50℃ (0 to + 40℃ for harmonic gear model)	
Storage temperature	− 20 to + 65℃	
Ambient operation humidity	20 to 90% RH (no condensation)	
Storage humidity	5 to 95% RH (no condensation)	
Operation altitude	1000 m (3280 feet) MAX. above sea level	
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 147 m/s² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.	
Impact resistance	490m/s² of acceleration for 11 ms with half-sine wave applying three times for X, Y, and Z axes each, 18 times in total.	
Insulation class	Class B (+ 130℃)	
Withstand voltage	At normal ambient temperature and humidity, no failure with 500 V AC @50/60 Hz applied for one minute between motor winding and frame.	At normal ambient temperature and humidity, no failure with 1500 V AC @50/60 Hz applied for one minute between motor winding and frame.
Insulation resistance	At normal ambient temperature and humidity, 100 Mohm or more on megger with 500 V DC between motor winding and frame.	
Protection grade	IP40	
Wiringtemperature increase	80K MAX. (Based on Sanyo Denki standard)	
Axial play (Note1)	0.075mm (0.002952inch) MAX., Load 4.4N (1lbs)	0.075mm (0.002952inch) MAX., Load 9N (2lbs)
Radial play (Note2)	0.025mm (0.00098inch) MAX., Load 4.4N (1lbs)	
Shaft runout	0.025mm (0.00098inch)	
Inserted part concentricity against shaft	ϕ 0.05mm (ϕ 0.00197inch)	ϕ 0.075mm (ϕ 0.00295inch)
Fitted surface angularity against shaft	0.1mm (0.00394inch)	0.1mm (0.00394inch)

(Note1) Axial play: Shaft displacement under axial load.
(Note2) Radial play: Shaft displacement under radial load applied 1/3rd of the length from the end of the shaft.

Internal wire connection

Connection Method: New Pentagon



Direction of motor rotate

The direction of motor rotate is clockwise when viewed from the output shaft side at the direct current energization in the following order.

※ This is an instance of the standard model and the electromagnetic brake model.
As for some of the models with the gear, the direction of motor rotation is different, please make inquiries.

		Exciting order									
		1	2	3	4	5	6	7	8	9	10
Color of leads	Blue			+	+	+			−	−	−
	Red	−	−			+	+	+			−
	Orange		−	−	−			+	+	+	
	Green	+			−	−	−			+	+
	Black	+	+	+			−	−	−		

Driver specifications

General specifications

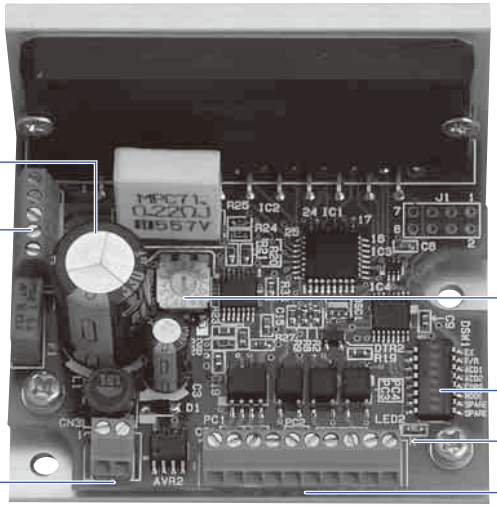
Basic specifications	Model number		**FS1D140P10**
	Power supply		DC24V/36V ± 10%
	Source current		3A
	Environment	Protection class	Class Ⅲ
		Operation environment	Installation category (over-voltage category) : Ⅰ (CE)　Pollution level : 2
		Ambient operation temperature	0 to ＋50℃
		Storage temperature	－20 to ＋70℃
		Ambient operation humidity	35 to 85% RH (no condensation)
		Storage humidity	10 to 90% RH (no condensation)
		Operation altitude	1000 m (3280 feet) or less above sea level
		Vibration resistance	Tested under the following conditions ; 5m/s², frequency range 10 to 55Hz, direction along X, Y and Z axes, for 2 hours each
		Impact resistance	Not influenced at NDS-C-0110 standard section 3.2.2 division "C" .
		Withstand voltage	Not influenced when 500V AC is applied between power input terminal and cabinet for one minute.
		Insulation resistance	10M ohm MIN. when measured with 500V DC megohmmeter between input terminal and cabinet.
	Mass		0.1kg
Functions	Selection function		Step angle, pulse input method, step current, non-operating current, and operating current
	Protection functions		Open phase protection, Voltage reduction in the main circuit power
	LED indication		Power monitor, alarm (motor cable fault, switching element fault, main circuit voltage out of specified range)
I/O signals	Command pulse input signal		Photo-coupler input system ; input resistance: 220 Ω ; input-signal "H" level : 4.0 to 5.5V ; input-signal "L" level : 0 to 0.5V, MAX. input frequency : 35kpulse/s
	Power down input signal		Photo-coupler input system ; input resistance: 220 Ω ; input-signal "H" level : 4.0 to 5.5V ; input-signal "L" level : 0 to 0.5V
	Input signal		Open collector output by photo coupler, output signal standard, Vceo = 40V MAX., Ic = 10 mA MAX.
	Output signal		Open collector output by photo coupler, output signal standard, Vceo = 40V MAX., Ic = 10 mA MAX.

Safety standards

	Directives	Category	Standard part	Name
CE (TÜV)	Low-voltage directives	－	EN61010-1	－
	EMC directives	Emission	EN55011-A	Terminal disturbance voltage
			EN55011-A	Electromagnetic radiation disturbance
		Immunity	EN61000-4-2	ESD (Electrostatic discharge)
			EN61000-4-3	RS (Radio-frequency amplitude modulated electromagnetic field)
			EN61000-4-4	Fast transionts
			EN61000-4-6	Surges
UL	Acquired standards		Standard part	File No.
	UL		UL508C	E179775
	UL for Canada (c-UL)			

・EMC characteristics may vary depending on the configuration of the users' control panel, which contains the driver or stepping motor, or the arrangement and wiring of other electrical devices.
・Validation test of driver has been performed for low-voltage EMC directives at TUV (TUV SUD Japan) for self-declaration of CE marking.

Driver Controls and Connectors



1 Current selection switch (RUN)

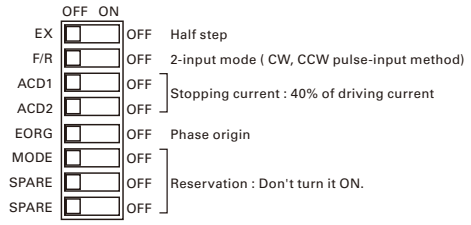
Enable to select operating current value to stepping motor.

Indication	0	1	2	3	4	5	6	7
Stepping motor current (A)	1.4	1.35	1.3	1.25	1.2	1.15	1.1	1.05
Indication	8	9	A	B	C	D	E	F
Stepping motor current (A)	1.0	0.95	0.9	0.85	0.8	0.75	0.7	0.65

The factory default value is F(0.65A).
Please check the rated current of the motor to be combined before selecting the operation current.

2 Function selection DIP switch

Selects an appropriate function for specification.
Factory default settings



Step angle selection (EX)

Selects the basic step angle.

EX	Exciting mode
ON	Full step (0.72˚ /pulse)
OFF	Half step (0.36˚ /pulse)

Input method select (F/R)

Selects input pulse type.

F/R	Input pulse type
ON	1 input (CK, U/D)
OFF	2 input (CW, CCW)

Current adjustment at operation halt (ACD1, ACD2)

Selects the value of the motor current during stand-still.

ACD2	ACD1	Motor current
ON	ON	100% of driving current
ON	OFF	60% of driving current
OFF	ON	50% of driving current
OFF	OFF	40% of driving current

Initial configuration of factory shipment is set to 40% of rated value.
Driver and motor should be operated at around 50% of rated value to reduce heat.

Excitation select (EORG)

The excitation phasse when the power supply is turned on is selected.

EORG	Original excitation phase
ON	Excitation phase at power shut off
OFF	Phase origin

By turning on the EORG, excitation phase when power OFF will be saved.
Therefore, there will be no shaft displacement when turning the power ON.

3 Power LED (POW)

Lights up when main circuit power supply is switched on.

Indication	Explanation
"POW" is displayed.	Main circuit power supply is switched on.

4 Alarm LED (ALM)

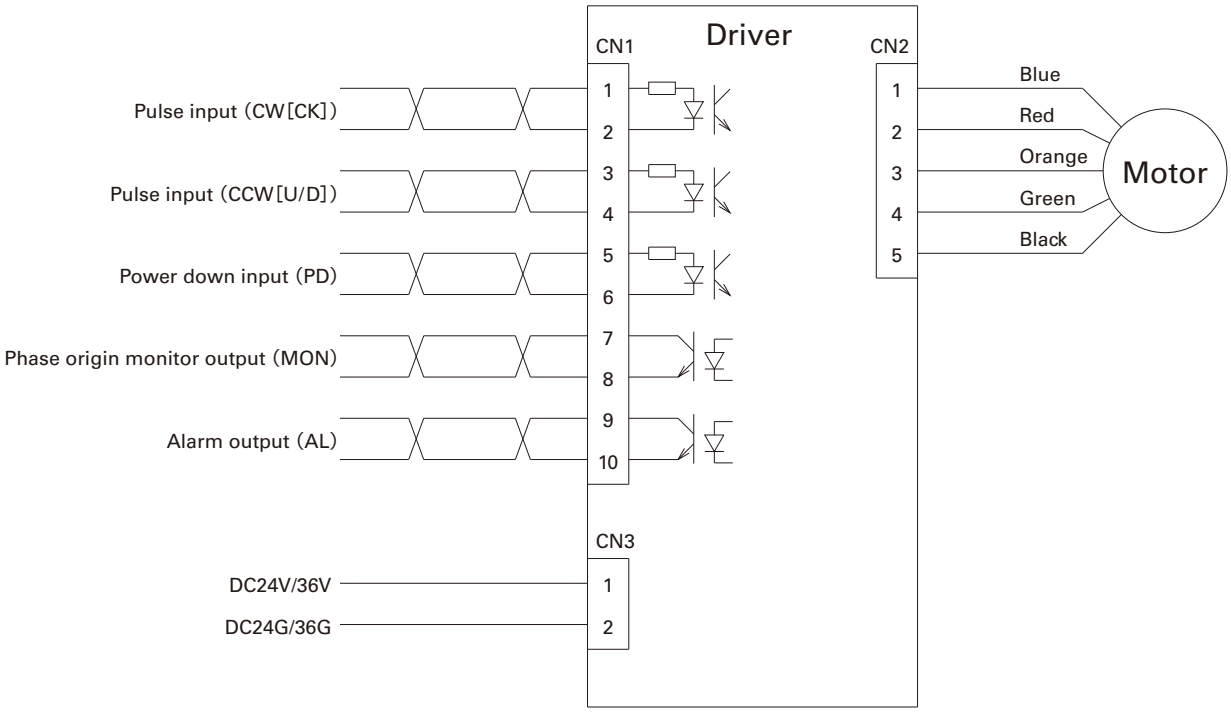
Lights up during alarm conditions.

Indication	Explanation
"ALM" is displayed.	Motor cable is broken, or switching element in driver is faulty. The main circuit voltage is out of specifications range (Less than DC19V).

When " ALM" is displayed, the winding current of the stepping motor is cut off and it is in a " non-excitation" state. At the same time, an output signal (photocoupler ON) is transmitted from the alarm output terminal (AL) to an external source. When the alarm circuit is operating, this state is maintained until it is reset by switching on the power supply again. When an alarm condition has occurred, please take corrective actions to rectify the cause of the alarm before switching on the power supply again.

Connections and Signals

External wiring diagram



Applicable wire sizes

Part	size	Allowable wire length
Power supply	AWG22 (0.3mm²)	2m max.
Input/output signal	AWG24 (0.2mm²) to AWG22 (0.3mm²)	2m max.
Motor	AWG22 (0.3mm²)	Less than 3m

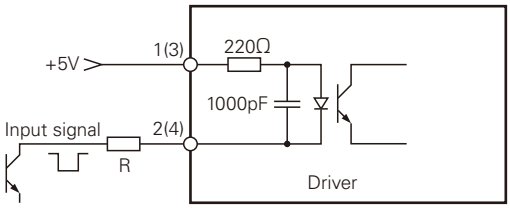
When bundling wire together or running wires through duct, take reduction rate of each wire allowable current into consideration.
When ambient temperature is relatively high, wire product lifetime is reduced due to heat deterioration.
In this case, please use Heat resistant Indoor PVC (HIV).

Specification summary of CN1 I/O signal

Signal name	CN1 Pin number	Function
CW pulse input (standard)	1 2	When using "2-input mode" Drive pulse for the CW direction rotation is input.
Pulse column input	1 2	When using "Pulse and direction mode" Drive pulse train for the stepping motor rotation is input.
CCW pulse input (standard)	3 4	When using "2-input mode" Drive pulse for the CCW direction rotation is input.
Rotation direction input	3 4	The rotation direction signal of stepping motor is input for the "Pulse and direction mode" . Internal photocoupler ON ··· CW direction Internal photocoupler OFF ··· CCW direction
Power down input	5 6	Inputting the PD signal cuts OFF the current flowing through the stepping motor. Iinternal photocoupler ON ··· PD function enabled Iinternal photocoupler OFF ··· PD function disabled
Phase origin monitor output	7 8	It is turned ON when the excitation phase is at the origin (in the state when the power is turned ON) It is turned ON once per 10 pulses when setting to HALF step. It is turned ON once per 20 pulses when setting to FULL step.
Alarm output	9 10	The signal is externally output (photocoupler ON) when one of several alarm circuits operates in the PM driver. At this time,the stepping motor is in the unexcited state.

The CW rotation direction of stepping motor means the clockwise direction rotation as viewed from the output shaft side (ange side).
The CCW rotation direction means the counterclockwise direction rotation as viewed from the output shaft side (ange side).

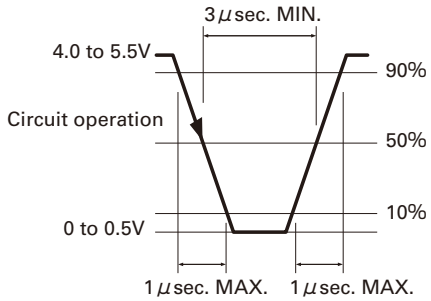
Input circuit configuration of CW (CK), CCW (U/D)



- Pulse duty 50% MAX.
- Maximum input frequency: 35kpulse/s
- When the crest value of the input signal exceeds 5V, use the external limit resistance R to limit the input current to approximately 15mA.

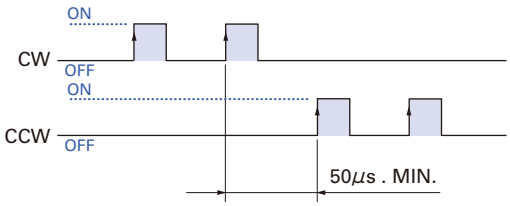
Input signal specification

〈Photo coupler〉



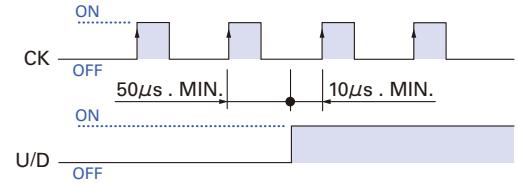
Timing of command pulse

2 input type (CW, CCW)



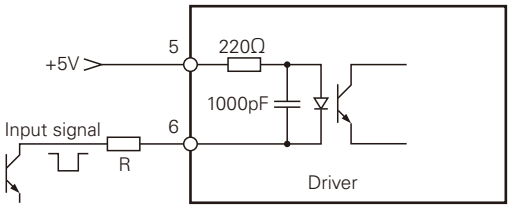
- The shaded regions in the diagram indicate when the internal photocoupler is ON. The internal circuit (motor) is active at the rising edge of the photocoupler pulses.
- To apply pulse to CW, set CCW side internal photo coupler to “OFF”.
- To apply pulse to CCW, set CW side internal photo coupler to “OFF”.

1 input type (CK, U/D)



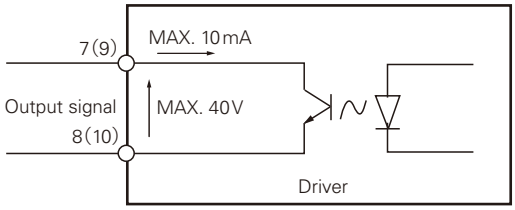
- The shaded regions in the diagram indicate when the internal photocoupler is ON. The internal circuit (motor) is active at the rising edge of the CK-side photocoupler pulses.
- Switching of U/D input signal must be done while CK side internal photo coupler is “OFF”.

Input circuit configuration of PD

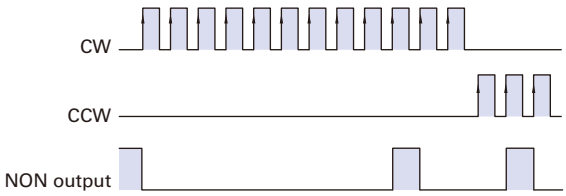


- If the peak value exceedes 5V, set the input current to approx. 15mA using the external limit resistance R.

Output signal configuration of MON, AL



MON output

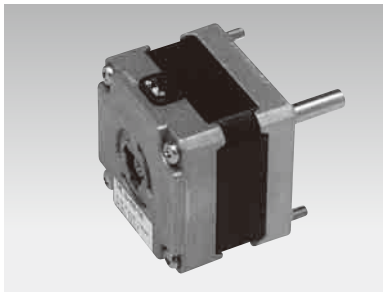


Ex.) Setting when number of division is 1 (full step)

- Photo coupler at phase origin of motor excitation (status at power on) is set to “ON”
- Output from MON is set to on at every 7.2 degrees of motor output shaft from phase origin.

Stepping Motor

Allowable load/Internal wire connection/Direction of motor rotate ▶ P.93 General specifications ▶ P.94
Motor dimensions ▶ P.97 to 100



39mm sq. (1.54inch sq.)

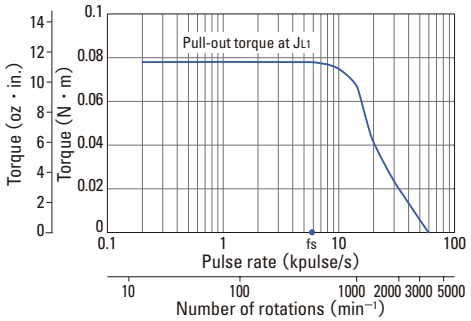
0.36° /step

Motor with leads

Model number		Holding torque at 5-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass(Weight)
Single shaft	Double shaft	[N・m (oz・in) MIN.]	A/phase	Ω /phase	mH/phase	[× 10⁻⁴kg・m² (oz・in²)]	kg (lbs)
103-4505-7040	**103-4505-7010**	0.078 (11.05)	0.75	2	1.97	0.0182 (0.10)	0.17 (0.37)
103-4507-7040	**103-4507-7010**	0.108 (15.29)	0.75	2.35	3.8	0.024 (0.13)	0.2 (0.44)
103-4510-7040	**103-4510-7010**	0.167 (23.65)	0.75	3	6.2	0.036 (0.20)	0.3 (0.66)

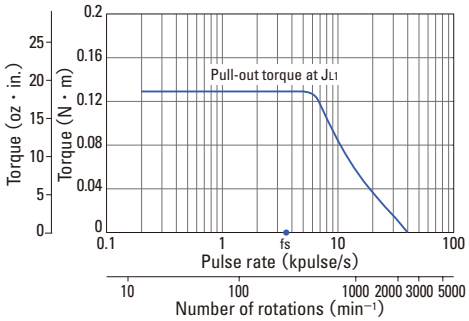
Characteristics

103-4505-7040
103-4505-7010



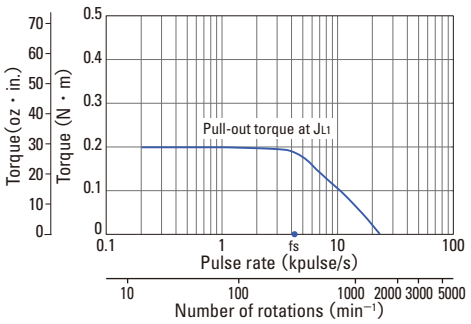
Constant current circuit
Source voltage : DC24V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [0.33 × 10⁻⁴kg・m² (1.80 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103-4507-7040
103-4507-7010



Constant current circuit
Source voltage : DC24V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [0.33 × 10⁻⁴kg・m² (1.80 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103-4510-7040
103-4510-7010



Constant current circuit
Source voltage : DC24V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [0.94 × 10⁻⁴kg・m² (5.14 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

Allowable load/Internal wire connection/Direction of motor rotate ▶ P.93 General specifications ▶ P.94 Motor dimensions ▶ P.97 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

φ 60mm (φ 2.36inch)

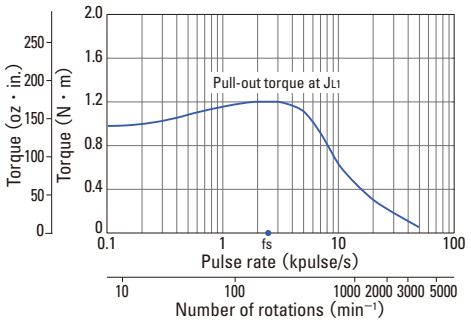
0.45° /step

Motor with leads

Model number		Holding torque at 5-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass(Weight)
Single shaft	Double shaft	[N・m (oz・in) MIN.]	A/phase	Ω /phase	mH/phase	[× 10^{-4}kg・m^2 (oz・in^2)]	kg (lbs)
103-7566-7041	**103-7566-7011**	0.91 (128.9)	0.75	4.8	23	0.235 (1.28)	1.1 (2.43)

Characteristics

103-7566-7041
103-7566-7011



Constant current circuit
Source voltage : AC100V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [2.6 × 10^{-4}kg・m^2 (14.22 oz・in^2) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

28mm sq. (1.10inch sq.)

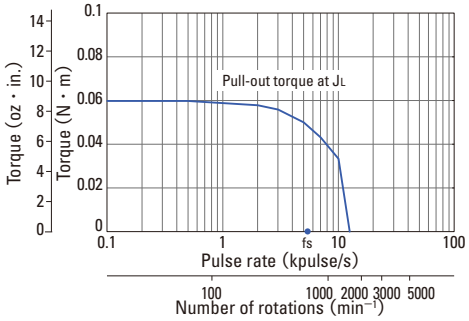
0.72° /step

Motor with leads

Model number		Holding torque at 5-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass(Weight)
Single shaft	Double shaft	[N・m (oz・in) MIN.]	A/phase	Ω /phase	mH/phase	[× 10^{-4}kg・m^2 (oz・in^2)]	kg (lbs)
SH5281-3041	**SH5281-3011**	0.045 (6.37)	0.35	4.5	2.7	0.01 (0.05)	0.11 (0.24)
SH5281-7041	**SH5281-7011**	0.041 (5.81)	0.75	1.05	0.44	0.01 (0.05)	0.11 (0.24)
SH5285-3041	**SH5285-3011**	0.085 (12.04)	0.35	5	3.5	0.022 (0.12)	0.2 (0.44)
SH5285-7041	**SH5285-7011**	0.078 (11.05)	0.75	1.15	0.64	0.022 (0.12)	0.2 (0.44)

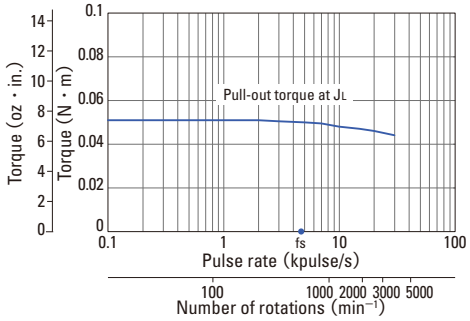
Characteristics

SH5281-3041
SH5281-3011



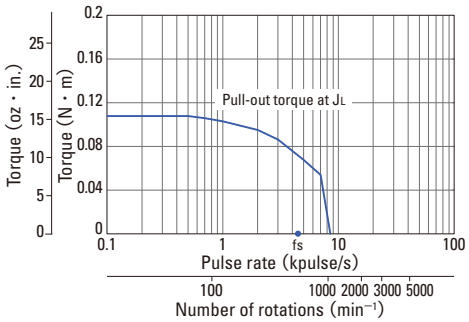
Constant current circuit
Source voltage : DC12V・operating current : 0.35A/phase
5-phase excitation (full step)
J^L= [0.01 × 10^{-4}kg・m^2 (0.05 oz・in^2) pulley balancer system]
fs: Maximum self - start frequency when not loaded

SH5281-7041
SH5281-7011



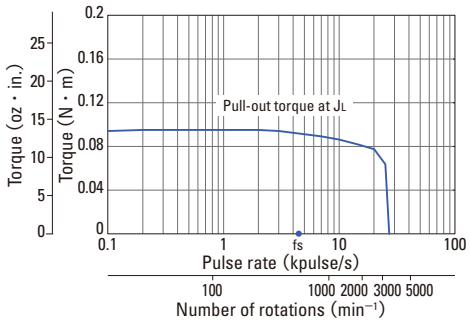
Constant current circuit
Source voltage : DC24V・operating current : 0.75A/phase
5-phase excitation (full step)
J^L= [0.01 × 10^{-4}kg・m^2 (0.05 oz・in^2) pulley balancer system]
fs: Maximum self - start frequency when not loaded

SH5285-3041
SH5285-3011



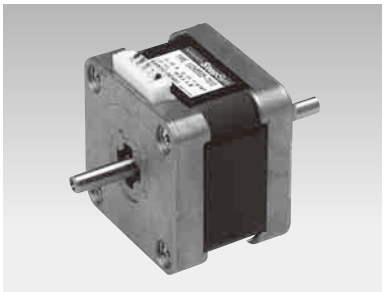
Constant current circuit
Source voltage : DC12V・operating current : 0.35A/phase
5-phase excitation (full step)
J^L= [0.01 × 10^{-4}kg・m^2 (0.05 oz・in^2) pulley balancer system]
fs: Maximum self - start frequency when not loaded

SH5285-7041
SH5285-7011



Constant current circuit
Source voltage : DC24V・operating current : 0.75A/phase
5-phase excitation (full step)
J^L= [0.01 × 10^{-4}kg・m^2 (0.05 oz・in^2) pulley balancer system]
fs: Maximum self - start frequency when not loaded

Allowable load/Internal wire connection/Direction of motor rotate ▶ P.93 General specifications ▶ P.94 Motor dimensions ▶ P.97 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.



42mm sq. (1.65inch sq.)

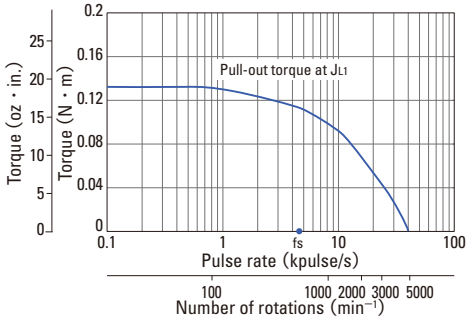
0.72° /step

Motor with leads

Model number		Holding torque at 5-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass(Weight)
Single shaft	Double shaft	[N・m (oz・in) MIN.]	A/phase	Ω /phase	mH/phase	[× 10⁻⁴kg・m² (oz・in²)]	kg (lbs)
103H5505-7040	**103H5505-7010**	0.127 (17.98)	0.75	1.45	1.2	0.03 (0.16)	0.23 (0.50)
103H5508-7040	**103H5508-7010**	0.176 (24.92)	0.75	1.6	1.8	0.053 (0.29)	0.28 (0.62)
103H5510-7040	**103H5510-7010**	0.255 (36.11)	0.75	2.2	2.2	0.065 (0.36)	0.37 (0.82)

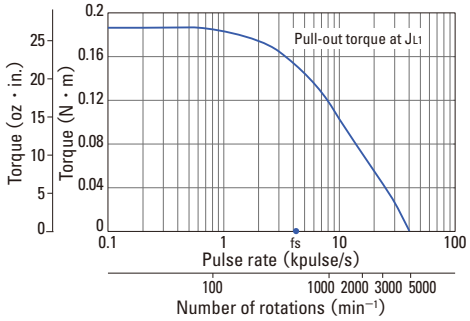
Characteristics

103H5505-7040
103H5505-7010



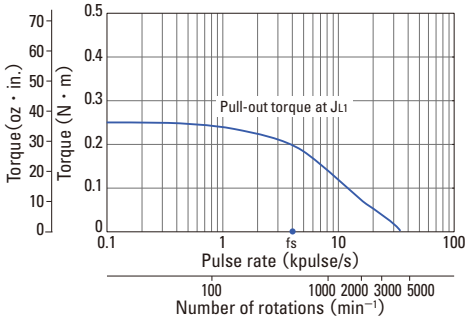
Constant current circuit
Source voltage : DC24V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [0.94 × 10⁻⁴kg・m² (5.14 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H5508-7040
103H5508-7010



Constant current circuit
Source voltage : DC24V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [0.94 × 10⁻⁴kg・m² (5.14 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H5510-7040
103H5510-7010



Constant current circuit
Source voltage : DC24V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [0.94 × 10⁻⁴kg・m² (5.14 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

50mm sq. (1.97inch sq.)

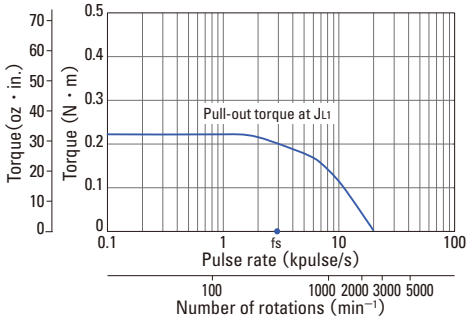
0.72° /step

Motor with leads

Model number		Holding torque at 5-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass(Weight)
Single shaft	Double shaft	[N・m (oz・in) MIN.]	A/phase	Ω /phase	mH/phase	[× 10^{-4}kg・m^2 (oz・in^2)]	kg (lbs)
103H6500-7041	**103H6500-7011**	0.235 (33.28)	0.75	2	4	0.057 (0.31)	0.38 (0.84)
103H6500-8041	**103H6500-8011**	0.225 (31.86)	1.5	0.47	0.85	0.057 (0.31)	0.38 (0.84)
103H6501-7041	**103H6501-7011**	0.39 (55.23)	0.75	2.6	5.6	0.105 (0.57)	0.44 (0.97)
103H6501-8041	**103H6501-8011**	0.39 (55.23)	1.5	0.65	1.45	0.105 (0.57)	0.44 (0.97)

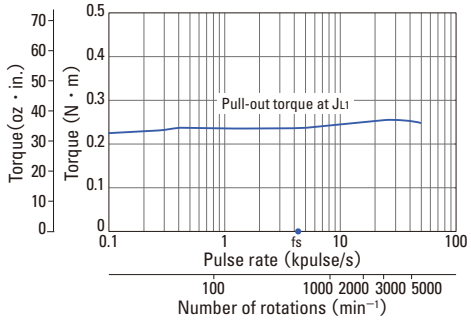
Characteristics

103H6500-7041
103H6500-7011



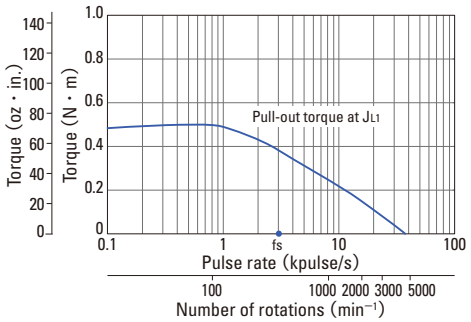
Constant current circuit
Source voltage : DC24V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [0.94 × 10^{-4}kg・m^2 (5.14 oz・in^2) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H6500-8041
103H6500-8011



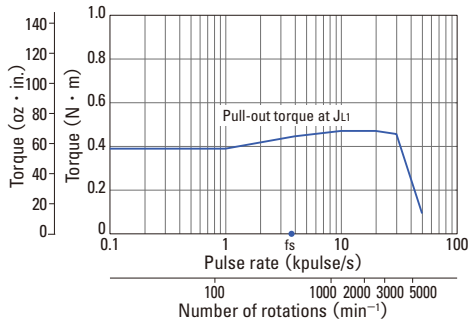
Constant current circuit
Source voltage : AC100V・operating current : 1.5A/phase
5-phase excitation (full step)
JL1= [0.94 × 10^{-4}kg・m^2 (5.14 oz・in^2) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H6501-7041
103H6501-7011



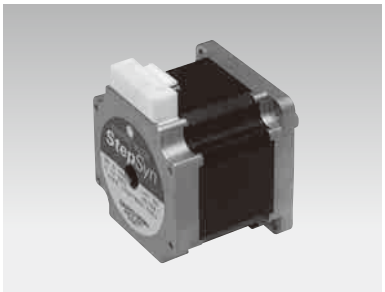
Constant current circuit
Source voltage : DC24V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [0.94 × 10^{-4}kg・m^2 (5.14 oz・in^2) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H6501-8041
103H6501-8011



Constant current circuit
Source voltage : AC100V・operating current : 1.5A/phase
5-phase excitation (full step)
JL1= [0.94 × 10^{-4}kg・m^2 (5.14 oz・in^2) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

Allowable load/Internal wire connection/Direction of motor rotate ▶ P.93 General specifications ▶ P.94 Motor dimensions ▶ P.98 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.



60mm sq. (2.36inch sq.)

0.72° /step

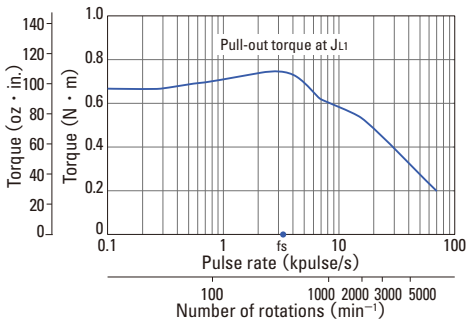
Motor with connector

Model number		Holding torque at 5-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass(Weight)
Single shaft	Double shaft	[N・m (oz・in) MIN.]	A/phase	Ω /phase	mH/phase	[× 10⁻⁴kg・m² (oz・in²)]	kg (lbs)
103H7851-7051	**103H7851-7021**	0.65 (92.0)	0.75	2.75	4.75	0.275 (1.50)	0.6 (1.32)
103H7851-8051	**103H7851-8021**	0.65 (92.0)	1.5	0.64	1.2	0.275 (1.50)	0.6 (1.32)
103H7852-7051	**103H7852-7021**	0.98 (138.8)	0.75	3.4	7.75	0.4 (2.19)	0.78 (1.72)
103H7852-8051	**103H7852-8021**	0.98 (138.8)	1.5	0.8	2	0.4 (2.19)	0.78 (1.72)
103H7853-7051	**103H7853-7021**	1.86 (263.4)	0.75	5.5	15	0.84 (4.59)	1.36 (3.00)
103H7853-8051	**103H7853-8021**	1.86 (263.4)	1.5	1.28	3.85	0.84 (4.59)	1.36 (3.00)

Optional Accessories : motor cable model number : 4837847-1

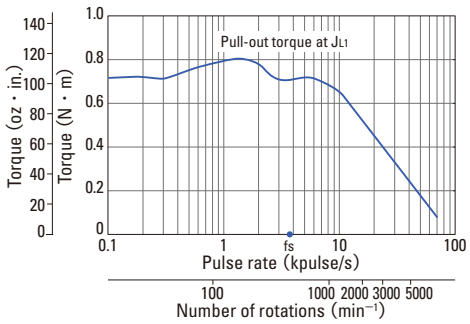
Characteristics

103H7851-7051
103H7851-7021



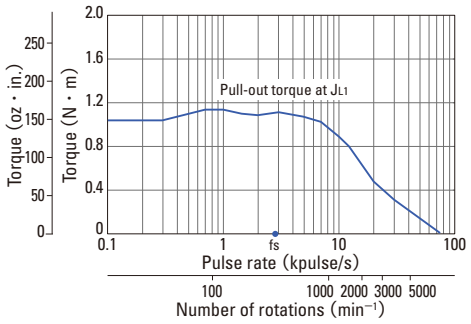
Constant current circuit
Source voltage : AC100V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [0.94 × 10⁻⁴kg・m² (5.15 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H7851-8051
103H7851-8021



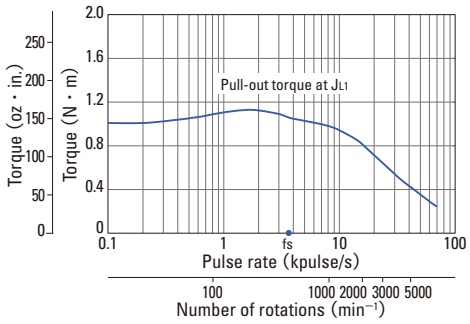
Constant current circuit
Source voltage : AC100V・operating current : 1.5A/phase
5-phase excitation (full step)
JL1= [2.6 × 10⁻⁴kg・m² (40.46 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H7852-7051
103H7852-7021



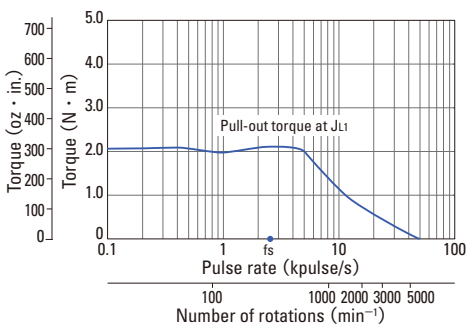
Constant current circuit
Source voltage : AC100V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [2.6 × 10⁻⁴kg・m² (40.46 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H7852-8051
103H7852-8021



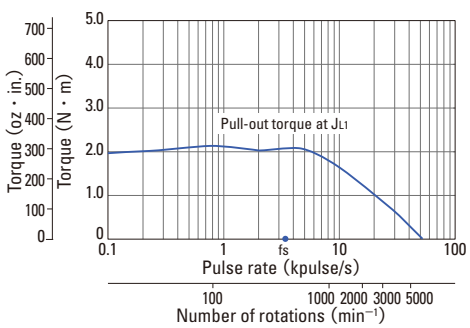
Constant current circuit
Source voltage : AC100V・operating current : 1.5A/phase
5-phase excitation (full step)
JL1= [2.6 × 10⁻⁴kg・m² (5.14 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H7853-7051
103H7853-7021



Constant current circuit
Source voltage : AC100V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [7.4 × 10⁻⁴kg・m² (14.22 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H7853-8051
103H7853-8021



Constant current circuit
Source voltage : AC100V・operating current : 1.5A/phase
5-phase excitation (full step)
JL1= [7.4 × 10⁻⁴kg・m² (40.46 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

ϕ 60mm (ϕ 2.36inch)

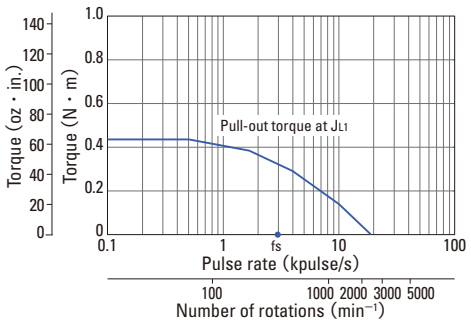
0.72° /step

Motor with leads

Model number		Holding torque at 5-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass(Weight)
Single shaft	Double shaft	[N・m (oz・in) MIN.]	A/phase	Ω /phase	mH/phase	[× 10⁻⁴kg・m² (oz・in²)]	kg (lbs)
103H7521-7051	**103H7521-7021**	0.46 (65.1)	0.75	2.4	4.3	0.148 (0.81)	0.51 (1.12)
103H7521-8051	**103H7521-8021**	0.46 (65.1)	1.5	0.6	1.1	0.148 (0.81)	0.51 (1.12)
103H7522-7051	**103H7522-7021**	0.735 (104.1)	0.75	3.3	7.5	0.18 (0.98)	0.6 (1.32)
103H7522-8051	**103H7522-8021**	0.735 (104.1)	1.5	0.75	2	0.18 (0.98)	0.6 (1.32)
103H7523-7051	**103H7523-7021**	1.568 (222.0)	0.75	5.2	21	0.423 (2.31)	1.1 (2.43)
103H7523-8051	**103H7523-8021**	1.568 (222.0)	1.5	1.4	5.4	0.423 (2.31)	1.1 (2.43)

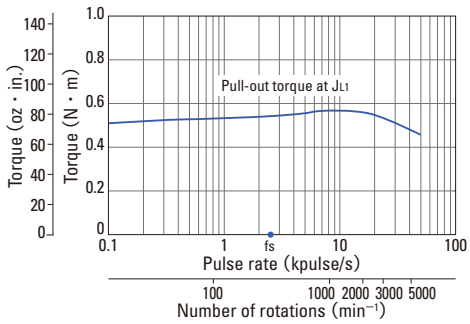
Characteristics

103H7521-7051
103H7521-7021



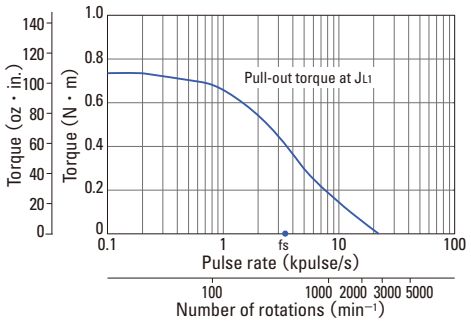
Constant current circuit
Source voltage : DC24V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [0.94 × 10⁻⁴kg・m² (5.14 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H7521-8051
103H7521-8021



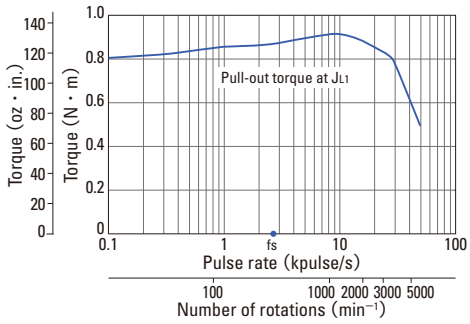
Constant current circuit
Source voltage : AC100V・operating current : 1.5A/phase
5-phase excitation (full step)
JL1= [0.94 × 10⁻⁴kg・m² (5.14 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H7522-7051
103H7522-7021



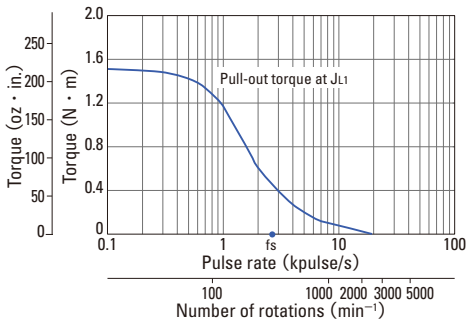
Constant current circuit
Source voltage : DC24V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [0.94 × 10⁻⁴kg・m² (14.22 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H7522-8051
103H7522-8021



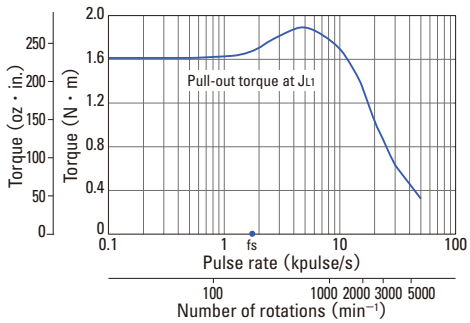
Constant current circuit
Source voltage : AC100V・operating current : 1.5A/phase
5-phase excitation (full step)
JL1= [2.6 × 10⁻⁴kg・m² (14.22 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H7523-7051
103H7523-7021



Constant current circuit
Source voltage : DC24V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [2.6 × 10⁻⁴Kg・m² (40.46 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H7523-8051
103H7523-8021



Constant current circuit
Source voltage : AC100V・operating current : 1.5A/phase
5-phase excitation (full step)
JL1= [7.4 × 10⁻⁴Kg・m² (40.46 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

Allowable load/Internal wire connection/Direction of motor rotate ▶ P.93 General specifications ▶ P.94 Motor dimensions ▶ P.99 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

ϕ 86mm (ϕ 3.39inch)

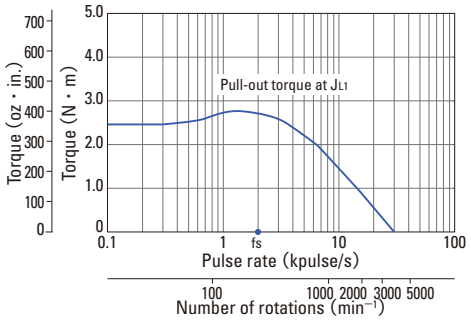
0.72° /step

Motor with leads

Model number		Holding torque at 5-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass(Weight)
Single shaft	Double shaft	[N・m (oz・in) MIN.]	A/phase	Ω /phase	mH/phase	[× 10⁻⁴kg・m² (oz・in²)]	kg (lbs)
103H8581-7041	**103H8581-7011**	2.06 (291.7)	0.75	5.7	25	1.45 (7.93)	1.5 (3.31)
103H8581-8041	**103H8581-8011**	2.06 (291.7)	1.5	1.5	5.6	1.45 (7.93)	1.5 (3.31)
103H8582-7041	**103H8582-7011**	4.02 (569.3)	0.75	8.6	41	2.9 (15.86)	2.5 (5.51)
103H8582-8041	**103H8582-8011**	4.02 (569.3)	1.5	2	10.6	2.9 (15.86)	2.5 (5.51)
103H8583-7041	**103H8583-7011**	6.17 (873.7)	0.75	10.5	59	4.4 (24.06)	3.5 (7.72)
103H8583-8041	**103H8583-8011**	6.17 (873.7)	1.5	2.5	15	4.4 (24.06)	3.5 (7.72)

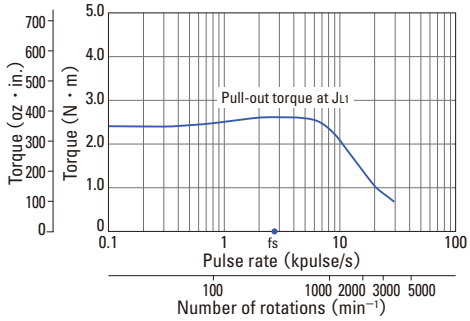
Characteristics

103H8581-7041
103H8581-7011



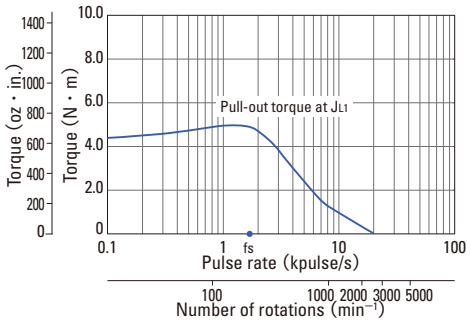
Constant current circuit
Source voltage : AC100V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [7.4 × 10⁻⁴kg・m² (40.46 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H8581-8041
103H8581-8011



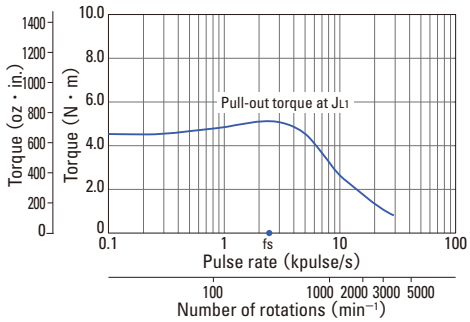
Constant current circuit
Source voltage : AC100V・operating current : 1.5A/phase
5-phase excitation (full step)
JL1= [7.4 × 10⁻⁴kg・m² (40.46 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H8582-7041
103H8582-7011



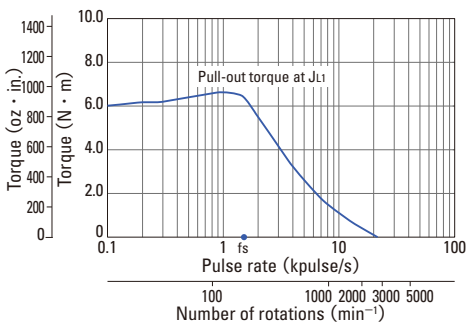
Constant current circuit
Source voltage : AC100V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [15.3 × 10⁻⁴kg・m² (83.65 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H8582-8041
103H8582-8011



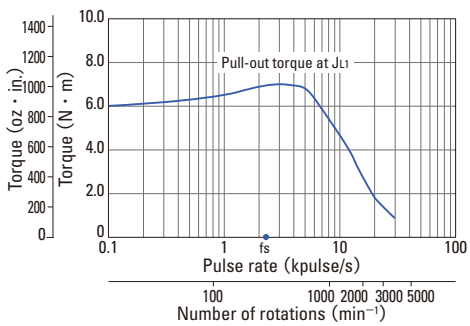
Constant current circuit
Source voltage : AC100V・operating current : 1.5A/phase
5-phase excitation (full step)
JL1= [15.3 × 10⁻⁴kg・m² (83.65 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H8583-7041
103H8583-7011



Constant current circuit
Source voltage : AC100V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [43 × 10⁻⁴kg・m² (235.10 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H8583-8041
103H8583-8011



Constant current circuit
Source voltage : AC100V・operating current : 1.5A/phase
5-phase excitation (full step)
JL1= [43 × 10⁻⁴kg・m² (235.10 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

ϕ106mm (ϕ4.17inch)

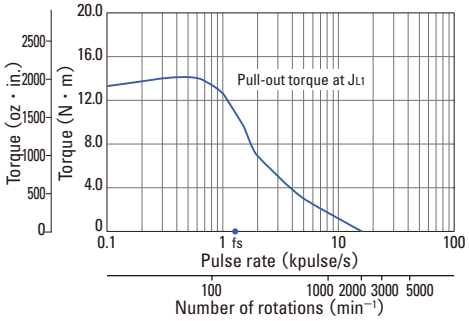
0.72° /step

Motor with leads

Model number		Holding torque at 5-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass(Weight)
Single shaft	Double shaft	[N・m (oz・in) MIN.]	A/phase	Ω /phase	mH/phase	[× 10⁻⁴kg・m² (oz・in²)]	kg (lbs)
103H89582-7041	**103H89582-7011**	10.8 (1529.4)	0.75	9	90	14.6 (79.83)	7.5 (16.53)
103H89582-8041	**103H89582-8011**	10.8 (1529.4)	1.5	2	26	14.6 (79.83)	7.5 (16.53)
103H89583-7041	**103H89583-7011**	16 (2265.7)	0.75	12.5	125	22 (120.28)	10.5 (23.15)
103H89583-8041	**103H89583-8011**	16 (2265.7)	1.5	2.9	33.4	22 (120.28)	10.5 (23.15)

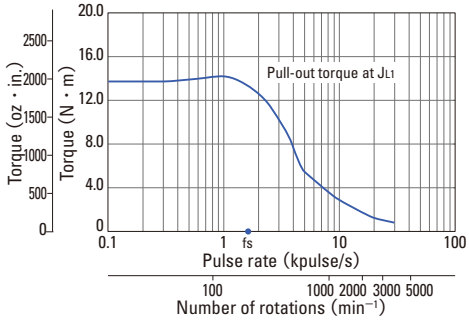
Characteristics

103H89582-7041
103H89582-7011



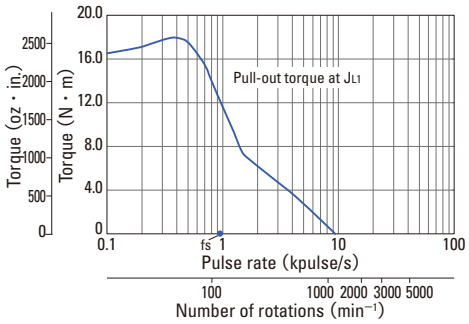
Constant current circuit
Source voltage : AC100V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [43 × 10⁻⁴kg・m² (235.10 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H89582-8041
103H89582-8011



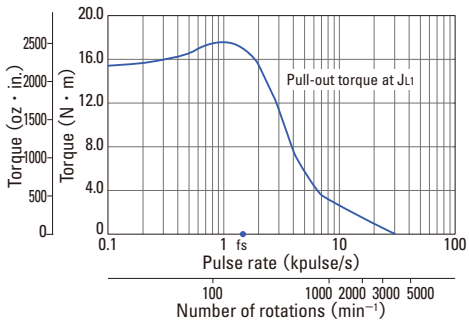
Constant current circuit
Source voltage : AC100V・operating current : 1.5A/phase
5-phase excitation (full step)
JL1= [43 × 10⁻⁴kg・m² (235.10 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

103H89583-7041
103H89583-7011



Constant current circuit
Source voltage : AC100V・operating current : 0.75A/phase
5-phase excitation (full step)
JL1= [43 × 10⁻⁴kg・m² (235.10 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

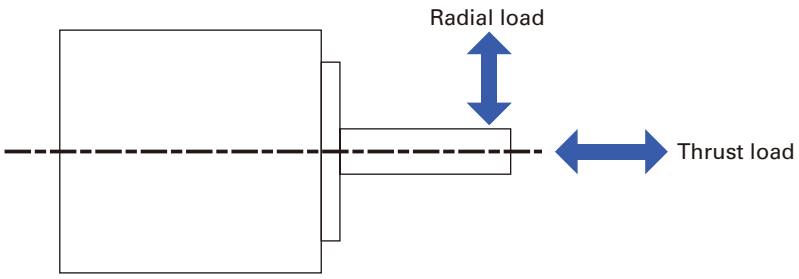
103H89583-8041
103H89583-8011



Constant current circuit
Source voltage : AC100V・operating current : 1.5A/phase
5-phase excitation (full step)
JL1= [43 × 10⁻⁴kg・m² (235.10 oz・in²) use the rubber coupling]
fs: Maximum self - start frequency when not loaded

Allowable load/Internal wire connection/Direction of motor rotate ▶ P.93 General specifications ▶ P.94 Motor dimensions ▶ P.100 The data are measured under the drive condition of our company. The drive torque may very depending on the accuracy of customer -side equipment.

Allowable radial / thrust load



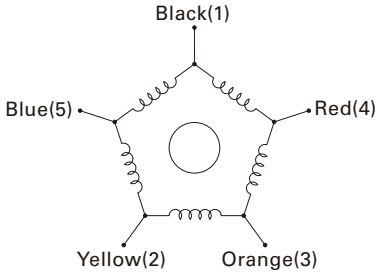
Motor size	Model number	unit	Distance from end of shaft : mm (inch)				Thrust load
			0	5 (0.2)	10 (2.25)	15 (3.38)	
			Radial load				
28mm sq. (1.10 inch sq.)	SH528 □ - □ 0 □ 1	N	42	47	53	—	3
		lbs	9	10	11	—	0.67
39mm sq. (1.54 inch sq.)	103-45 □□ -70 □ 0	N	26	33	42	60	10
		lbs	5	7	9	13	2.25
42mm sq. (1.65 inch sq.)	103H55 □□ -70 □ 0 103F55 □□	N	29	36	49	52	10
		lbs	6	8	11	11	2.25
50mm sq. (1.97 inch sq.)	103H650 □ - □ 0 □ 1	N	71	87	115	167	15
		lbs	15	19	25	37	3.37
60mm sq. (2.36inch sq.)	103H785 □ - □ 0 □ 1	N	70	87	114	165	20
		lbs	15	19	25	37	4.5
	103F78 □□ 103M78 □□	N	62	75	94	127	20
		lbs	13	16	21	28	4.5
ϕ60mm (ϕ2.36 inch)	103-7566-70 □ 1	N	68	85	113	166	15
		lbs	15	19	25	37	3.37
	103H752 □ - □ 0 □ 1	N	94	116	153	222	15
		lbs	21	26	34	49	3.37
ϕ86mm (ϕ3.39 inch)	103H858 □ -6 □□ 0	N	191	234	301	421	60
		lbs	42	52	67	94	13
	103F85 □□ 103M85 □□	N	350	424	535	726	60
		lbs	78	95	120	163	13
ϕ106mm (ϕ4.17 inch)	103H8958 □ -6 □□ 0 103F895 □□ 103M895 □□	N	321	356	401	457	100
		lbs	72	80	90	102	22

Internal wire connection and direction of motor rotate

Internal wire connection

Connector pin numbers in parentheses ( ).

Connection Method: Pentagon



Direction of motor rotate

The direction of motor rotate is counterclockwise when viewed from the output shaft side at the direct current energization in the following order.

As for some of the models with the gear, the direction of motor rotation is different, please make inquiries.

Type				Exciting order									
				1	2	3	4	5	6	7	8	9	10
Color of leads	Black	Connector pin No.	(1)	−	−	−	−		+	+	+	+	
	Red		(4)		+	+	+	+		−	−	−	−
	Orange		(3)	+		−	−	−	−		+	+	+
	Yellow		(2)	−	−		+	+	+	+		−	−
	Blue		(5)	+	+	+		−	−	−	−		+

General specifications

Model number	SH528 □	103H55 □□	103H650 □	103H752 □	103H785 □	103H858 □	103H8958 □	103-45 □□	103-7566
Ambient operation temperature	− 10 to + 50℃								
Storage temperature	− 20 to + 65℃								
Ambient operation humidity	20 to 90% RH (no condensation)								
Storage humidity	5 to 95% RH (no condensation)								
Operation altitude	1000 m (3280 feet) MAX. above sea level								
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 147 m/s² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.								
Impact resistance	490m/s² of acceleration for 11 ms with half-sine wave applying three times for X, Y, and Z axes each, 18 times in total.								
Insulation class	Class B (+ 130℃)								
Withstand voltage	At normal ambient temperature and humidity, no failure with 1000 V AC @50/60 Hz applied for one minute between motor winding and frame (500 V AC for models SH528 □ . 103H55 □□ , and 103-45 □□).								
Insulation resistance	At normal ambient temperature and humidity, 100 Mohm or more on megger with 500 V DC between motor winding and frame.								
Protection grade	IP40								
Wiringtemperature increase	80K MAX. (Based on Sanyo Denki standard)								
Standing angle error	± 0.09°	± 0.09°	± 0.09°	± 0.09°	± 0.09°	± 0.09°	± 0.09°	± 0.04°	± 0.09°
Axial play (Note1)	0.075mm (0.002952inch) MAX., Load 4.4N (1lbs)	0.075mm (0.002952inch) MAX., Load 4.4N (1lbs)	0.075mm (0.002952inch) MAX., Load 9N (2lbs)	0.075mm (0.002952inch) MAX., Load 9N (2lbs)	0.075mm (0.002952inch) MAX., Load 9N (2lbs)	0.075mm (0.002952inch) MAX., Load 9N (2lbs)	0.075mm (0.002952inch) MAX., Load 9N (2lbs)	0.075mm (0.002952inch) MAX., Load 4.4N (1lbs)	0.075mm (0.002952inch) MAX., Load 9N (2lbs)
Radial play (Note2)	0.025mm (0.00098inch) MAX., Load 4.4N (1lbs)								
Shaft runout	0.025mm (0.00098inch)						0.05mm (0.00196inch)	0.025mm (0.00098inch)	
Inserted part concentricity against shaft	φ 0.05mm (φ 0.00197inch)	φ 0.05mm (φ 0.00197inch)	φ 0.075mm (φ 0.00295inch)	φ 0.075mm (φ 0.00295inch)	φ 0.075mm (φ 0.00295inch)	φ 0.075mm (φ 0.00295inch)	φ 0.075mm (φ 0.00295inch)	φ 0.05mm (φ 0.00197inch)	φ 0.075mm (φ 0.00295inch)
Fitted surface angularity against shaft	0.1mm (0.00394inch)	0.1mm (0.00394inch)	0.075mm (0.00295inch)	0.075mm (0.00295inch)	0.075mm (0.00295inch)	0.075mm (0.00295inch)	0.075mm (0.00295inch)	0.075mm (0.00295inch)	0.075mm (0.00295inch)

(Note1) Axial play: Shaft displacement under axial load.
(Note2) Radial play: Shaft displacement under radial load applied 1/3rd of the length from the end of the shaft.

Linear Actuator Stepping Motor

Dimensions ▶ P.106

Features

- System Miniaturization
  This product incorporates a ball screw inside the stepping motor to make it compact. This allows equipment size to be reduced.
- Large Thrust
- Long Stroke Length

Application

Semiconductor manufacturing equipment, general industrial machinery, machine tools application and transport equipment.

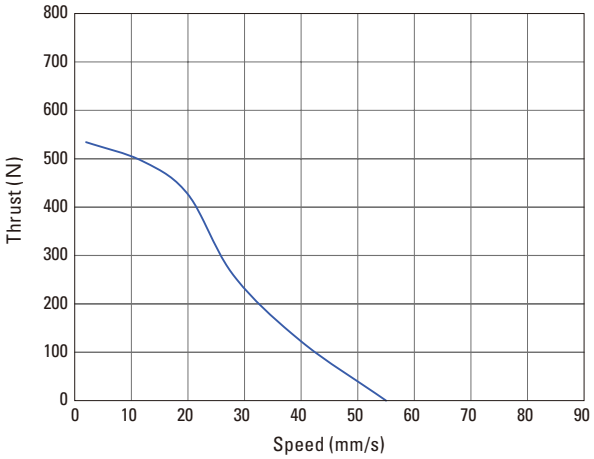
Specifications

Set Model number	SL5421-7241	SL5421-72XB41	SL5601-8241	SL5601-82XB41
Brake	Without	With	Without	With
Motor size	42mm (1.65inch)		60mm (2.36inch)	
Rated current	0.75A/phase		1.4A/phase	
Stroke	50mm (1.97inch)		80mm (3.14inch)	
Thrust	370N		450N	
Brake retention	Without	370N	Without	450N
Speed	48mm/s		64mm/s	
Resolution	0.004mm (0.0001inch)		0.008mm (0.0002inch)	
Positioning repeatability	± 0.02mm			
Lost motion	0.1mm (0.00394inch)			
Mass	0.65kg	0.8kg	1.4kg	1.7kg
Standard combined stepping driver model	FS1D140P10 (Specifications ▶ P.79)			

・Connection Method: New Pentagon

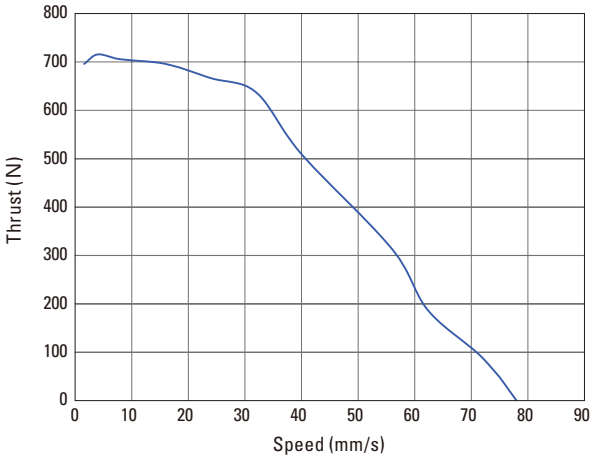
Characteristics

Set model number : SL5421-72 □□



Drive condition
Driver : FS1D140P10
Source current : 24 VDC
Excitation current : 0.75 A/phase
Excitation mode : 4-phase excitation (Full step)

Set model number : SL5601-82 □□



Drive condition
Driver : FS1D140P10
Source current : 24 VDC
Excitation current : 1.4 A/phase
Excitation mode : 4-phase excitation (Full step)

Stepping motor for vacuum environment

Customized Products

Features

- This stepping motor can operate within a vacuum environment without requiring an introducer. It can be used as an actuator in a vacuum environment while maintaining its stepping capabilities for precise control with a simple open loop.
- Customizable stepping motor for a wide range of pressure environments from low to ultra-high vacuums.
- Avaliable baked at 200˚C.
- Size is almost the same as normal stepping motors.

Intended Operating Pressure

low vacuum				medium vacuum		high vacuum				ultra-high vacuum				
10^5	10^4	10^3	10^2	10^1	1	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}	10^{-8}	[Pa]

Application

Ideal for the following applications. Contact us to discuss your particular application environment needs.

- Semiconductor manufacturing equipment
- Satellite robotics
- Electron microscopes
- Major research facilities such as particle accelerators and radiation analysis systems.

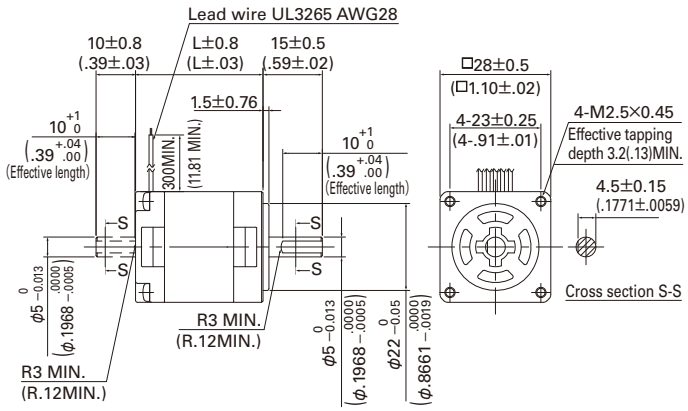
Motor size

39mm sq.(1.54inch sq.) to ϕ 106mm(ϕ 4.17inch)

Stepping motor dimensions [Unit : mm (inch)]

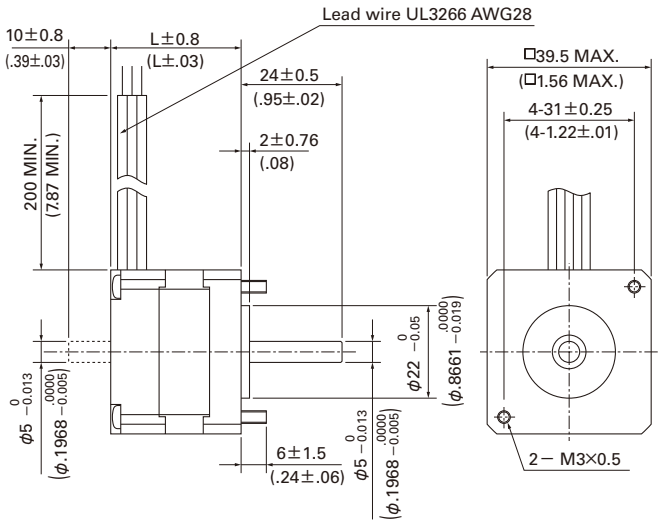
Set model configuration motor (standard model / CE · UL model) · Stepping Motor

28mm sq. (1.10inch sq.)



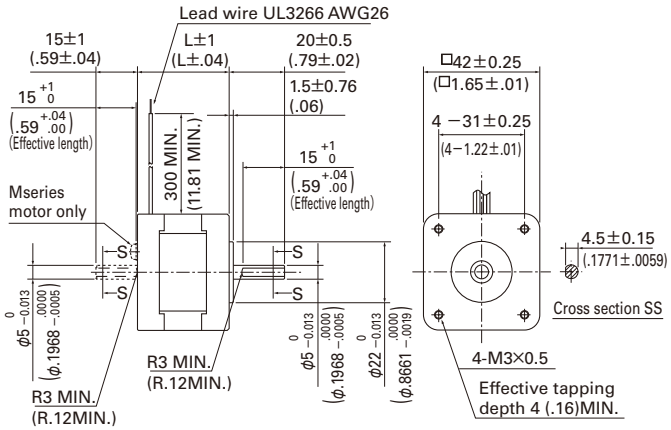
Set model number		Motor model number		Motor length (L) [mm(inch)]
Single shaft	Double shaft	Single shaft	Double shaft	
FAF521S FDF521S	FAF521D FDF521D	SH5281-7241	SH5281-7211	32 (1.26)
FAF525S FDF525S	FAF525D FDF525D	SH5285-7241	SH5285-7211	51.5 (2.03)
–	–	SH5281-3041	SH5281-3011	32 (1.26)
–	–	SH5281-7041	SH5281-7011	
–	–	SH5285-3041	SH5285-3011	51.5 (2.03)
–	–	SH5285-7041	SH5285-7011	

39mm sq. (1.54inch sq.)

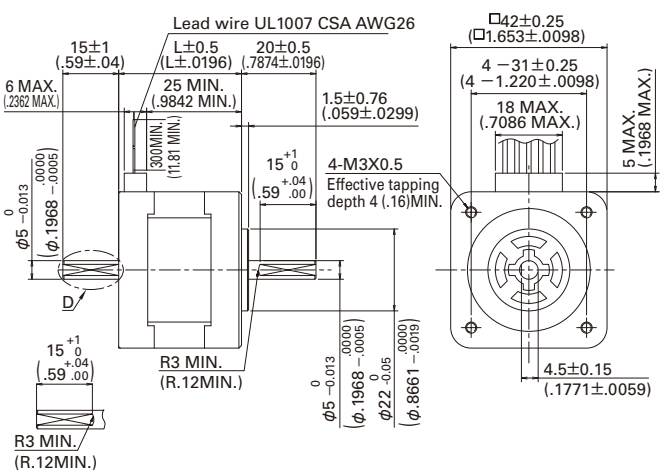


Set model number	Motor model number		Motor length (L) [mm(inch)]
	Single shaft	Double shaft	
–	103-4505-7040	103-4505-7010	31 (1.22)
–	103-4507-7040	103-4507-7010	35.2 (1.39)
–	103-4510-7040	103-4510-7010	44.3 (1.74)

42mm sq. (1.65inch sq.)



Set model number		Motor model number		Motor length (L) [mm(inch)]
Single shaft	Double shaft	Single shaft	Double shaft	
FSF551S	FSF551D	103F5505-7041	103F5505-7011	34 (1.34)
FSM551S	FSM551D	103M5505-7041	103M5505-7011	
FSF552S	FSF552D	103F5508-7041	103F5508-7011	40 (1.57)
FSM552S	FSM552D	103M5508-7041	103M5508-7011	
FSF554S	FSF554D	103F5510-7041	103F5510-7011	49 (1.93)
FSM554S	FSM554D	103M5510-7041	103M5510-7011	
FAF551S FDF551S	FAF551D FDF551D	103F5505-8241	103F5505-8211	34 (1.34)
FAF552S FDF552S	FAF552D FDF552D	103F5508-8241	103F5508-8211	40 (1.57)
FAF554S FDF554S	FAF554D FDF554D	103F5510-8241	103F5510-8211	49 (1.93)

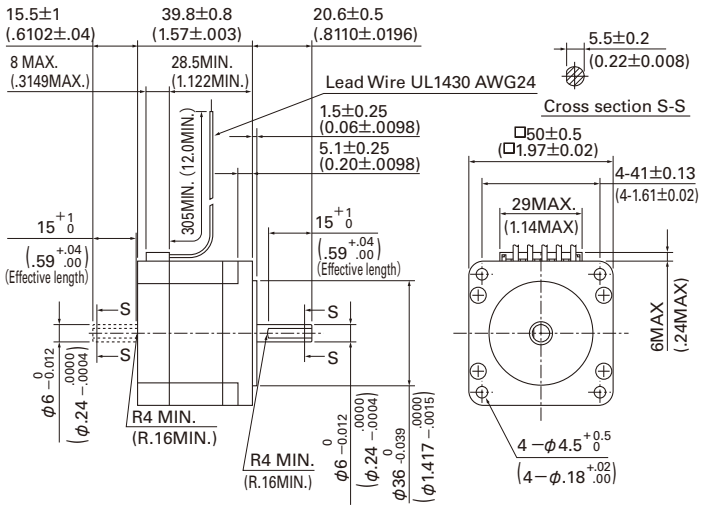


Set model number	Motor model number		Motor length (L) [mm(inch)]
	Single shaft	Double shaft	
–	103H5505-7040	103H5505-7010	33 (1.3)
–	103H5508-7040	103H5508-7010	39 (1.54)
–	103H5510-7040	103H5510-7010	48 (1.89)

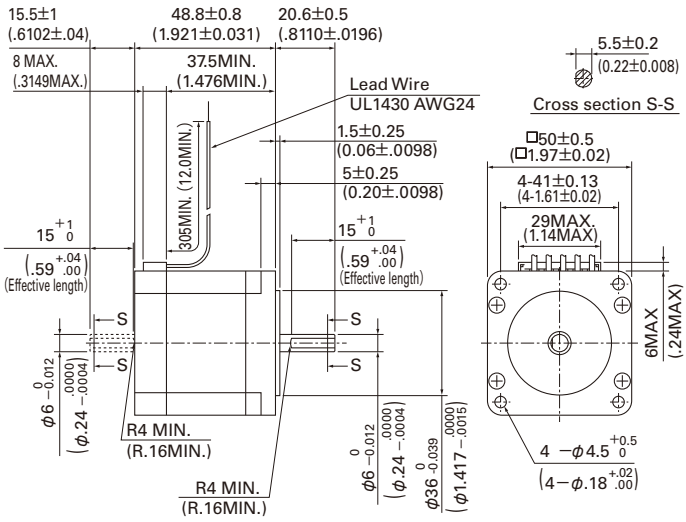
Stepping motor dimensions [Unit : mm (inch)]

Set model configuration motor (standard model / CE · UL model) · Stepping Motor

50mm sq. (1.97inch sq.)

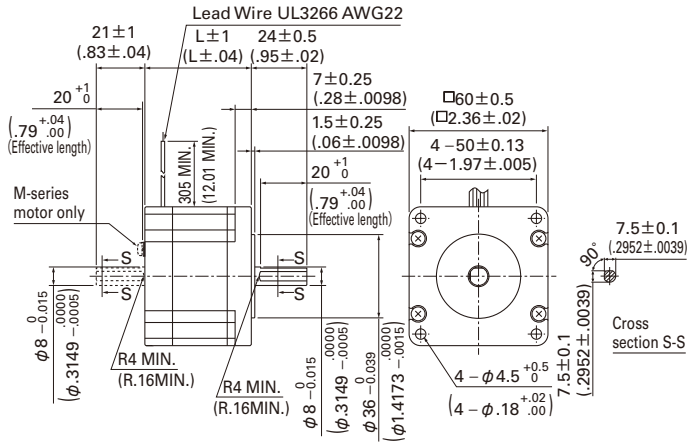


Set model number	Motor model number	
	Single shaft	Double shaft
–	103H6500-7041	103H6500-7011
–	103H6500-8041	103H6500-8011

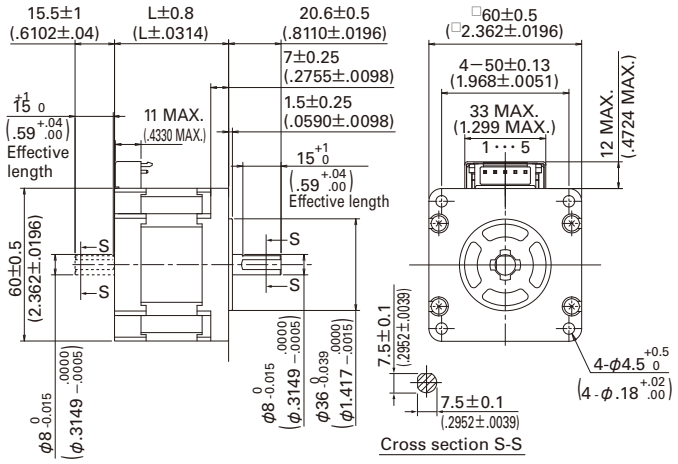


Set model number	Motor model number	
	Single shaft	Double shaft
–	103H6501-7041	103H6501-7011
–	103H6501-8041	103H6501-8011

60mm sq. (2.36inch sq.)

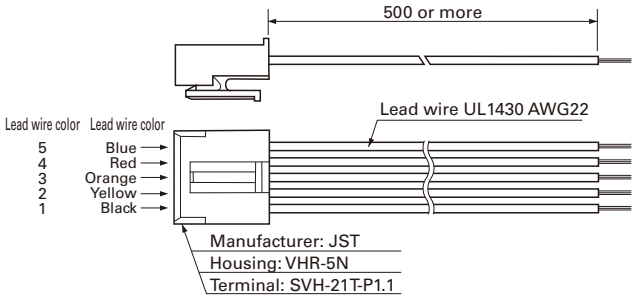


Set model number		Motor model number		Motor length (L) [mm(inch)]
Single shaft	Double shaft	Single shaft	Double shaft	
FSF781S	FSF781D	103F7851-7041	103F7851-7011	46.5 (1.83)
FSM781S	FSM781D	103M7851-7041	103M7851-7011	
FSF782S	FSF782D	103F7852-7041	103F7852-7011	55 (2.17)
FSM782S	FSM782D	103M7852-7041	103M7852-7011	
FSF783S	FSF783D	103F7853-7041	103F7853-7011	87.5 (3.44)
FSM783S	FSM783D	103M7853-7041	103M7853-7011	
FAF781S FDF781S	FAF781D FDF781D	103F7851-8241	103F7851-8211	46.5 (1.83)
FAF782S FDF782S	FAF782D FDF782D	103F7852-8241	103F7852-8211	55 (2.17)
FAF783S FDF783S	FAF783D FDF783D	103F7853-8241	103F7853-8211	87.5 (3.44)



Set model number	Motor model number		Motor length (L) [mm(inch)]
	Single shaft	Double shaft	
–	103H7851-7051 103H7851-8051	103H7851-7021 103H7851-8021	44.8 (1.76)
–	103H7852-7051 103H7852-8051	103H7852-7021 103H7852-8021	53.8 (2.1)
–	103H7853-7051 103H7853-8051	103H7853-7021 103H7853-8021	85.8 (3.38)

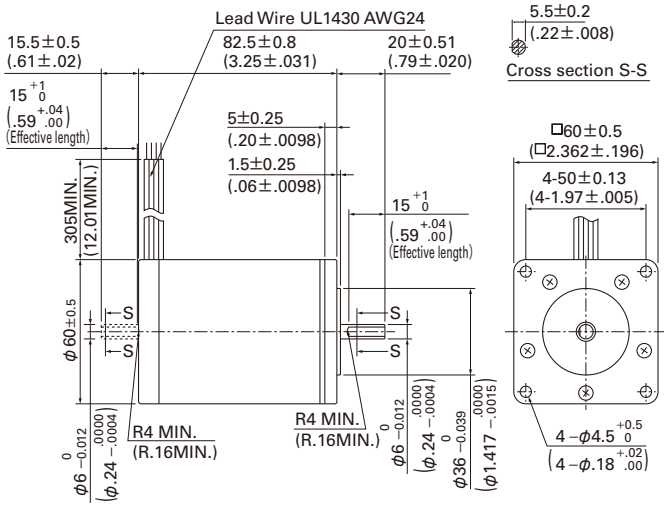
Motor cable Model No. : 4837847-1

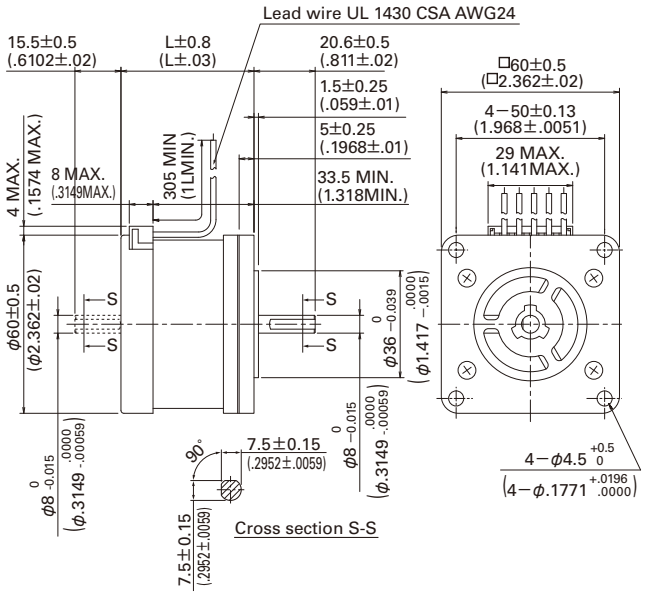


Cable for model number : 103H785□-□0□1 motor (between motor and driver)

Set model configuration motor (standard model / CE · UL model) · Stepping Motor

ϕ60mm (ϕ2.36inch)

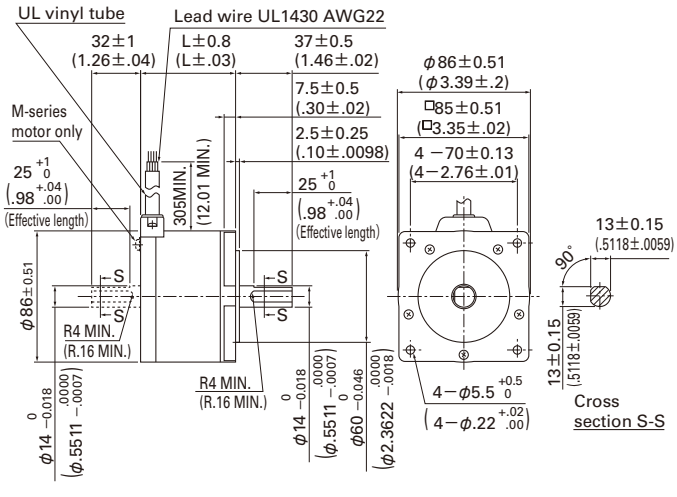


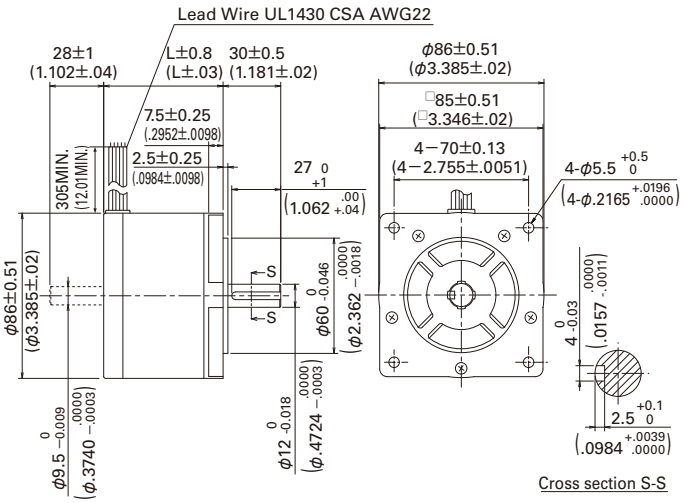


Set model number	Motor model number	
	Single shaft	Double shaft
–	103-7566-7041	103-7566-7011

Set model number	Motor model number		Motor length (L) [mm(inch)]
	Single shaft	Double shaft	
–	103H7521-7051 103H7521-8051	103H7521-7021 103H7521-8021	44.8 (1.76)
–	103H7522-7051 103H7522-8051	103H7522-7021 103H7522-8021	53.8 (2.1)
–	103H7523-7051 103H7523-8051	103H7523-7021 103H7523-8021	85.8 (3.38)

ϕ86mm (ϕ3.39inch)





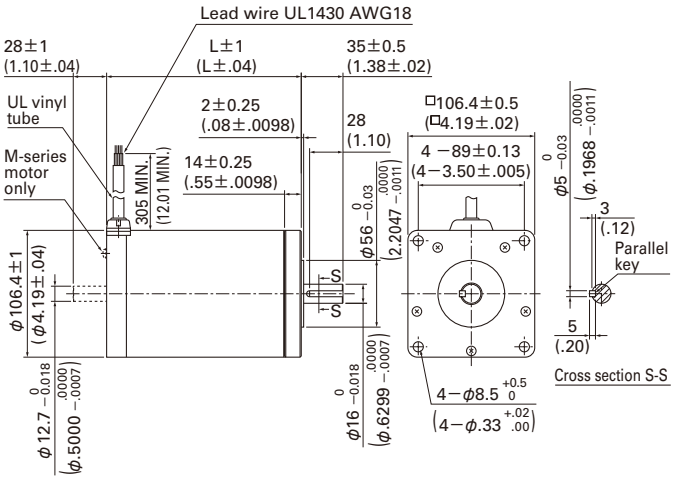
Set model number		Motor model number		Motor length (L) [mm(inch)]
Single shaft	Single shaft	Single shaft	Double shaft	
FSF851S	FSF851D	103F8581-7041	103F8581-7011	62.15 (2.47)
FSM851S	FSM851D	103M8581-7041	103M8581-7011	
FSF852S	FSF852D	103F8582-7041	103F8582-7011	92.2 (3.63)
FSM852S	FSM852D	103M8582-7041	103M8582-7011	
FSF853S	FSF853D	103F8583-7041	103F8583-7011	125.85 (4.95)
FSM853S	FSM853D	103M8583-7041	103M8583-7011	
FAF851S FDF851S	FAF851D FDF851D	103F8581-8241	103F8581-8211	62.15 (2.47)
FAF852S FDF852S	FAF852D FDF852D	103F8582-8241	103F8582-8211	92.2 (3.63)

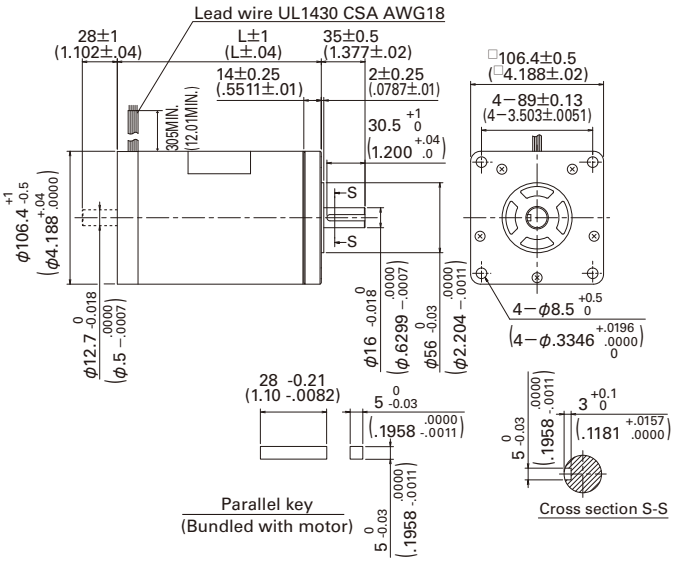
Set model number	Motor model number		Motor length (L) [mm(inch)]
	Single shaft	Double shaft	
–	103H8581-7041 103H8581-8041	103H8581-7011 103H8581-8011	62.15 (2.47)
–	103H8582-7041 103H8582-8041	103H8582-7011 103H8582-8011	92.2 (3.63)
–	103H8583-7041 103H8583-8041	103H8583-7011 103H8583-8011	125.85 (4.95)

Stepping motor dimensions [Unit : mm (inch)]

Set model configuration motor (Standard model / CE · UL model) · Stepping motor

ϕ106mm (ϕ4.17inch)



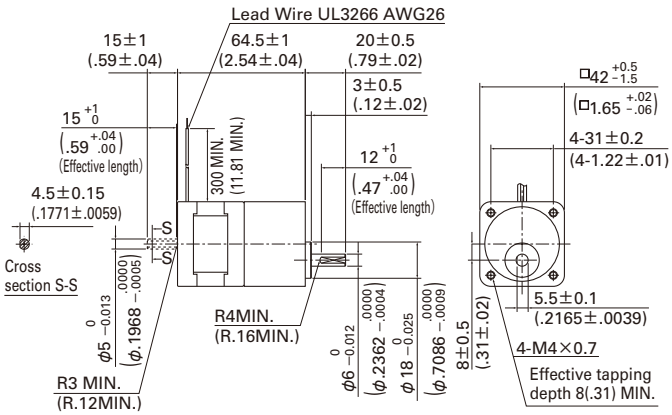


Set model number		Motor model number		Motor length (L) [mm(inch)]
Single shaft	Double shaft	Single shaft	Double shaft	
FSF892S	FSF892D	103F89582-7041	103F89582-7011	163.3 (6.43)
FSM892S	FSM892D	103M89582-7041	103M89582-7011	
FSF893S	FSF893D	103F89583-7041	103F89583-7011	221.3 (8.71)
FSM893S	FSM893D	103M89583-7041	103M89583-7011	

Set model number	Motor model number		Motor length (L) [mm(inch)]
	Single shaft	Double shaft	
–	103H89582-7041 103H89582-8041	103H89582-7011 103H89582-8011	163.3 (6.43)
–	103H89583-7041 103H89583-8041	103H89583-7011 103H89583-8011	221.3 (8.71)

Set model configuration motor (Low-backlash gear model)

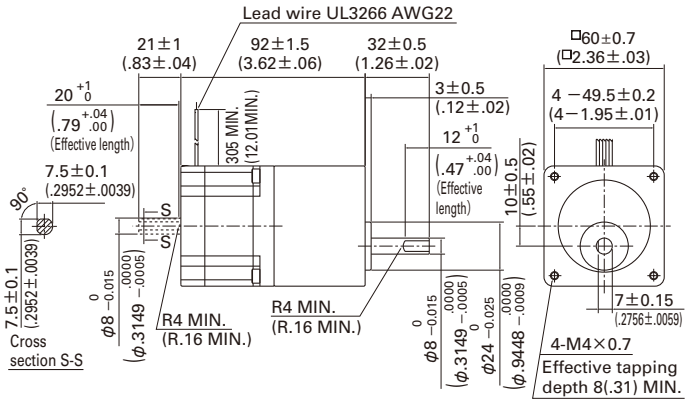
42mm sq. (1.65inch sq.)



Set model number		Motor model number	
Single shaft	Double shaft	Single shaft	Double shaft
F□F551S-CX3.6	F□F551D-CX3.6	103F5505-■■CXA4	103F5505-■■CXA1
F□F551S-CX7.2	F□F551D-CX7.2	103F5505-■■CXB4	103F5505-■■CXB1
F□F551S-CX10	F□F551D-CX10	103F5505-■■CXE4	103F5505-■■CXE1
F□F551S-CX20	F□F551D-CX20	103F5505-■■CXG4	103F5505-■■CXG1
F□F551S-CX30	F□F551D-CX30	103F5505-■■CXJ4	103F5505-■■CXJ1
F□F551S-CX36	F□F551D-CX36	103F5505-■■CXK4	103F5505-■■CXK1

For '□' in the set model numbers, 'S' denotes AC input, 'A' denotes DC input micro-step, and 'D' denotes DC input Full/Half-step.
For '■■' in the motor model numbers, '70' denotes AC input, and '82' denotes DC input.

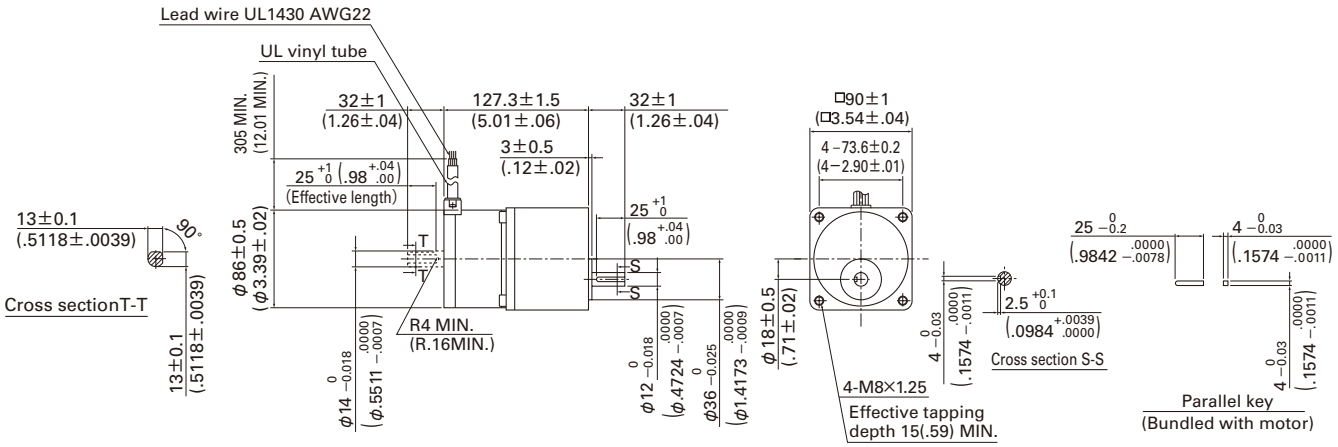
60mm sq. (2.36inch sq.)



Set model number		Motor model number	
Single shaft	Double shaft	Single shaft	Double shaft
F□F781S-CX3.6	F□F781D-CX3.6	103F7851-■■CXA4	103F7851-■■CXA1
F□F781S-CX7.2	F□F781D-CX7.2	103F7851-■■CXB4	103F7851-■■CXB1
F□F781S-CX10	F□F781D-CX10	103F7851-■■CXE4	103F7851-■■CXE1
F□F781S-CX20	F□F781D-CX20	103F7851-■■CXG4	103F7851-■■CXG1
F□F781S-CX30	F□F781D-CX30	103F7851-■■CXJ4	103F7851-■■CXJ1
F□F781S-CX36	F□F781D-CX36	103F7851-■■CXK4	103F7851-■■CXK1

For '□' in the set model numbers, 'S' denotes AC input, 'A' denotes DC input micro-step, and 'D' denotes DC input Full/Half-step.
For '■■' in the motor model numbers, '70' denotes AC input, and '82' denotes DC input.

ϕ86mm (ϕ3.39inch)



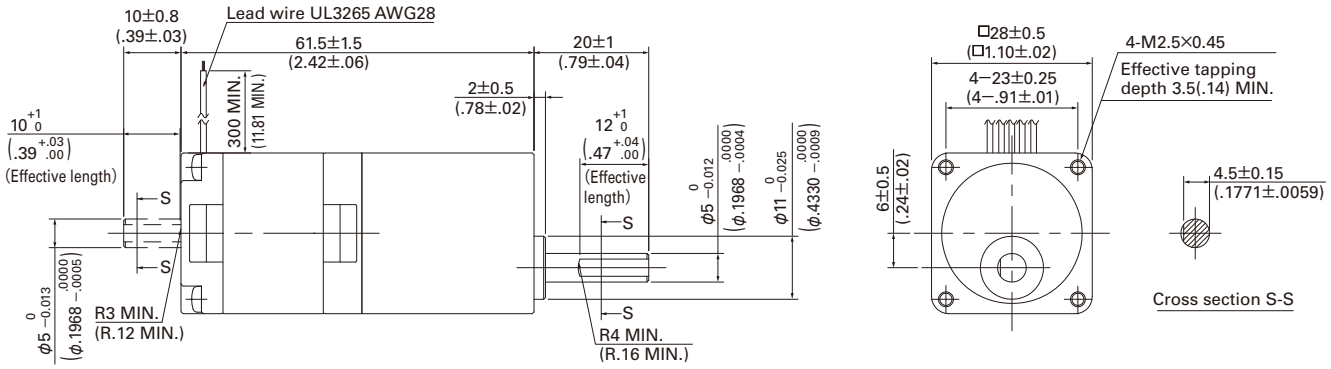
Set model number		Motor model number	
Single shaft	Double shaft	Single shaft	Double shaft
F□F851S-CX3.6	F□F851D-CX3.6	103F8581-■■CXA4	103F8581-■■CXA1
F□F851S-CX7.2	F□F851D-CX7.2	103F8581-■■CXB4	103F8581-■■CXB1
F□F851S-CX10	F□F851D-CX10	103F8581-■■CXE4	103F8581-■■CXE1
F□F851S-CX20	F□F851D-CX20	103F8581-■■CXG4	103F8581-■■CXG1
F□F851S-CX30	F□F851D-CX30	103F8581-■■CXJ4	103F8581-■■CXJ1
F□F851S-CX36	F□F851D-CX36	103F8581-■■CXK4	103F8581-■■CXK1

For '□' in the set model numbers, 'S' denotes AC input, 'A' denotes DC input micro-step, and 'D' denotes DC input Full/Half-step.
For '■■' in the motor model numbers, '70' denotes AC input, and '82' denotes DC input.

Stepping motor dimensions [Unit : mm (inch)]

Set model configuration motor (Spur gear model)

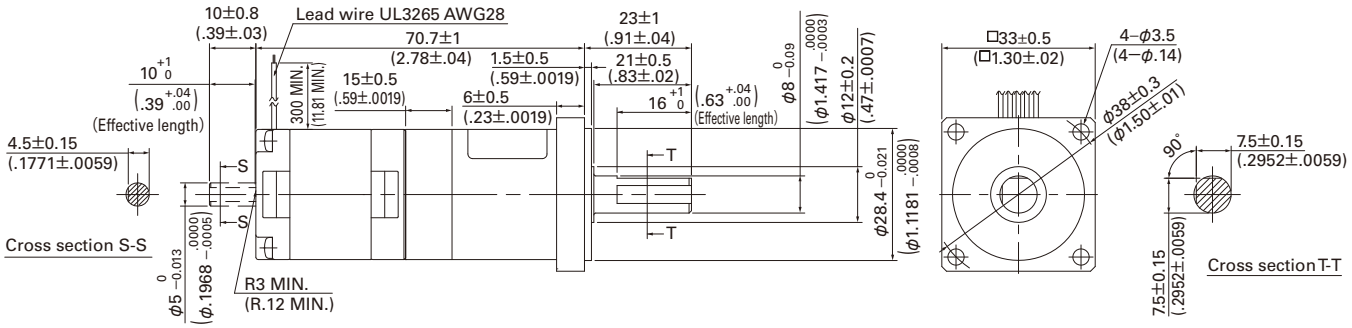
28mm sq. (1.10inch sq.)



Set model number		Motor model number	
Single shaft	Double shaft	Single shaft	Double shaft
FAF521S-GX3.6 FDF521S-GX3.6	FAF521D-GX3.6 FDF521D-GX3.6	SH5281-72GXA4	SH5281-72GXA1
FAF521S-GX7.2 FDF521S-GX7.2	FAF521D-GX7.2 FDF521D-GX7.2	SH5281-72GXB4	SH5281-72GXB1
FAF521S-GX10 FDF521S-GX10	FAF521D-GX10 FDF521D-GX10	SH5281-72GXE4	SH5281-72GXE1
FAF521S-GX20 FDF521S-GX20	FAF521D-GX20 FDF521D-GX20	SH5281-72GXG4	SH5281-72GXG1
FAF521S-GX30 FDF521S-GX30	FAF521D-GX30 FDF521D-GX30	SH5281-72GXJ4	SH5281-72GXJ1
FAF521S-GX50 FDF521S-GX50	FAF521D-GX50 FDF521D-GX50	SH5281-72GXL4	SH5281-72GXL1

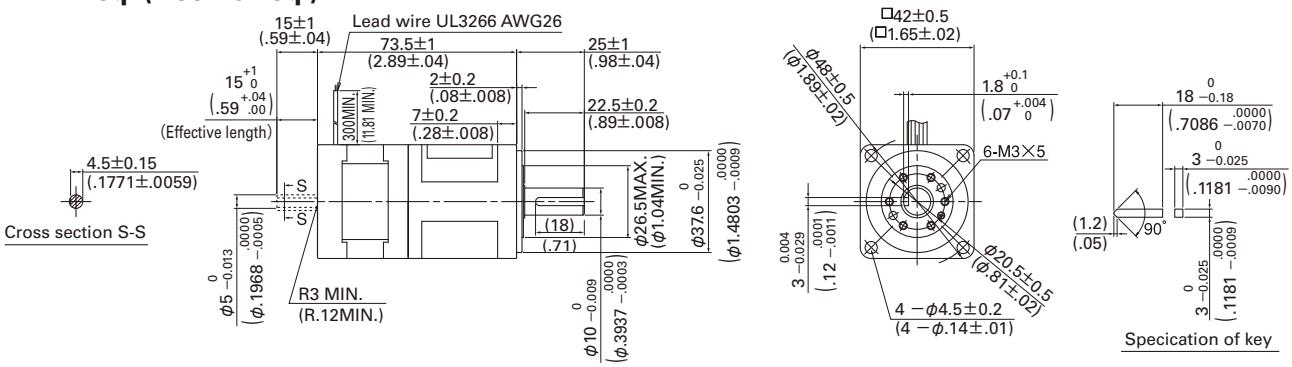
Set model configuration motor (Harmonic gear model)

28mm sq. (1.10inch sq.)



Set model number		Motor model number	
Single shaft	Double shaft	Single shaft	Double shaft
FAF521S-HX50 FDF521S-HX50	FAF521D-HX50 FDF521D-HX50	SH5281-72HXL4	SH5281-72HXL1
FAF521S-HX100 FDF521S-HX100	FAF521D-HX100 FDF521D-HX100	SH5281-72HXM4	SH5281-72HXM1

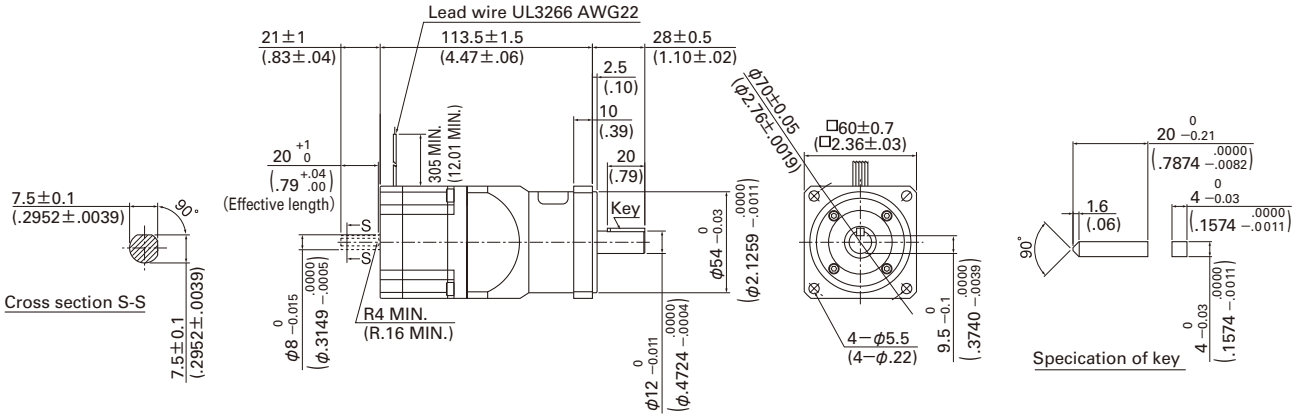
42mm sq. (1.65inch sq.)



Set model number		Motor model number	
Single shaft	Double shaft	Single shaft	Double shaft
FSF551S-HX30	FSF551D-HX30	103F5505-70HXJ5	103F5505-70HXJ2
FAF551S-HX30 FDF551S-HX30	FAF551D-HX30 FDF551D-HX30	103F5505-82HXJ5	103F5505-82HXJ2
FSF551S-HX50	FSF551D-HX50	103F5505-70HXL5	103F5505-70HXL2
FAF551S-HX50 FDF551S-HX50	FAF551D-HX50 FDF551D-HX50	103F5505-82HXL5	103F5505-82HXL2
FSF551S-HX100	FSF551D-HX100	103F5505-70HXM5	103F5505-70HXM2
FAF551S-HX100 FDF551S-HX100	FAF551D-HX100 FDF551D-HX100	103F5505-82HXM5	103F5505-82HXM2

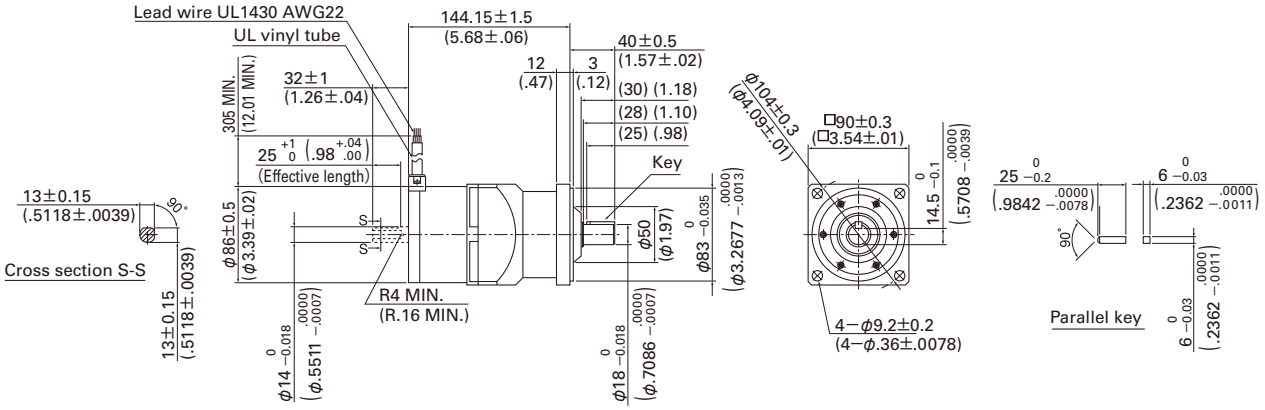
Set model configuration motor (Harmonic gear model)

60mm sq. (2.36inch sq.)



Set model number		Motor model number	
Single shaft	Double shaft	Single shaft	Double shaft
FSF781S-HX50	FSF781D-HX50	103F7851-70HXL4	103F7851-70HXL1
FAF781S-HX50 FDF781S-HX50	FAF781D-HX50 FDF781D-HX50	103F7851-82HXL4	103F7851-82HXL1
FSF781S-HX100	FSF781D-HX100	103F7851-70HXM4	103F7851-70HXM1
FAF781S-HX100 FDF781S-HX100	FAF781D-HX100 FDF781D-HX100	103F7851-82HXM4	103F7851-82HXM1

φ86mm (φ3.39inch)

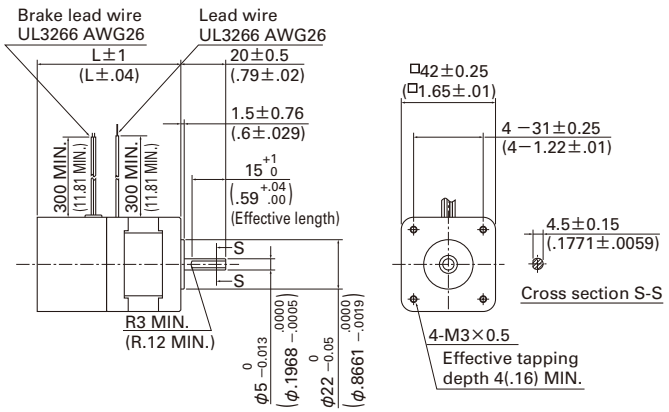


Set model number		Motor model number	
Single shaft	Double shaft	Single shaft	Double shaft
FSF851S-HX50	FSF851D-HX50	103F8581-70HXL4	103F8581-70HXL1
FAF851S-HX50 FDF851S-HX50	FAF851D-HX50 FDF851D-HX50	103F8581-82HXL4	103F8581-82HXL1
FSF851S-HX100	FSF851D-HX100	103F8581-70HXM4	103F8581-70HXM1
FAF851S-HX100 FDF851S-HX100	FAF851D-HX100 FDF851D-HX100	103F8581-82HXM4	103F8581-82HXM1

Stepping motor dimensions [Unit : mm (inch)]

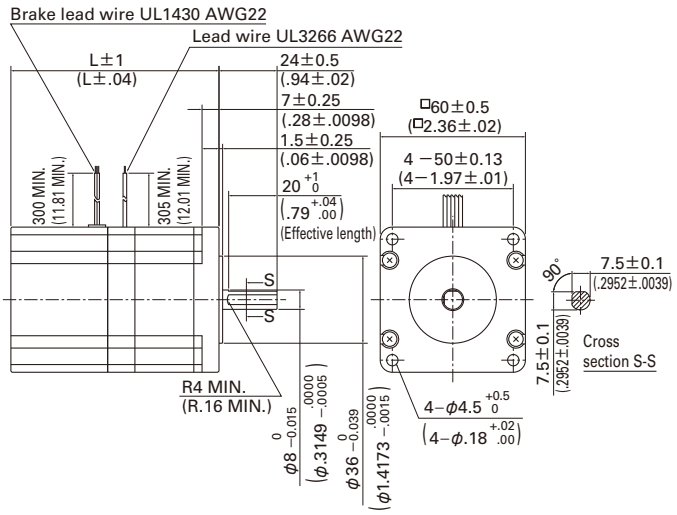
Set model configuration motor (Electromagnetic brake model)

42mm sq. (1.65inch sq.)



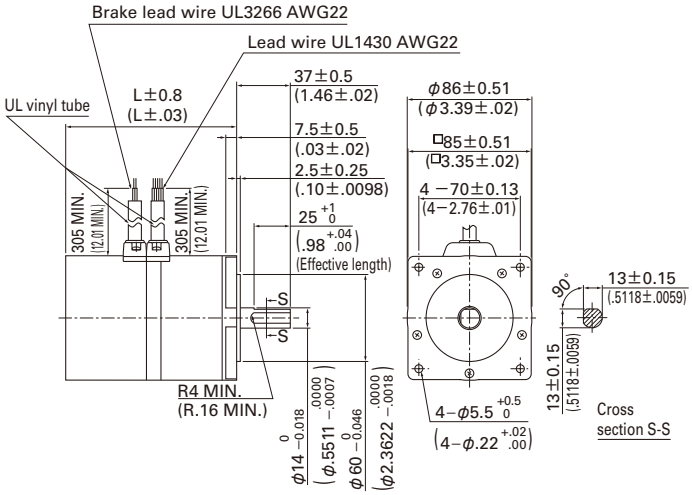
Set model number	Motor model number	Motor + brake length (L)
FSF551S-XB	103F5505-70XB41	64.5 (2.54)
FAF551S-XB FDF551S-XB	103F5505-82XB41	
FSF552S-XB	103F5508-70XB41	70.5 (2.78)
FAF552S-XB FDF552S-XB	103F5508-82XB41	
FSF554S-XB	103F5510-70XB41	79.5 (3.13)
FAF554S-XB FDF554S-XB	103F5510-82XB41	

60mm sq. (2.36inch sq.)



Set model number	Motor model number	Motor + brake length (L)
FSF781S-XB	103F7851-70XB41	85.8 (3.38)
FAF781S-XB FDF781S-XB	103F7851-82XB41	
FSF782S-XB	103F7852-70XB41	94.5 (3.72)
FAF782S-XB FDF782S-XB	103F7852-82XB41	
FSF783S-XB	103F7853-70XB41	126.7 (4.99)
FAF783S-XB FDF783S-XB	103F7853-82XB41	

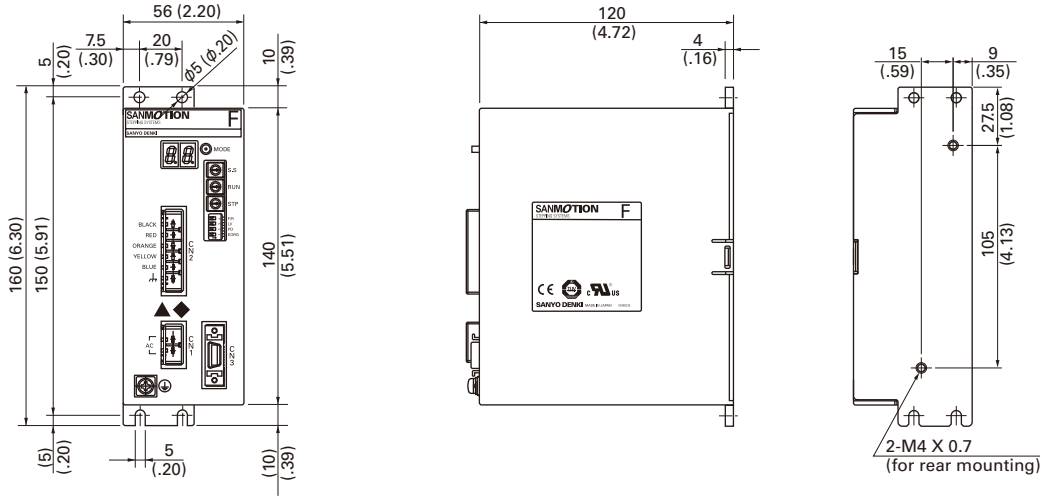
φ86mm (3.39inch)



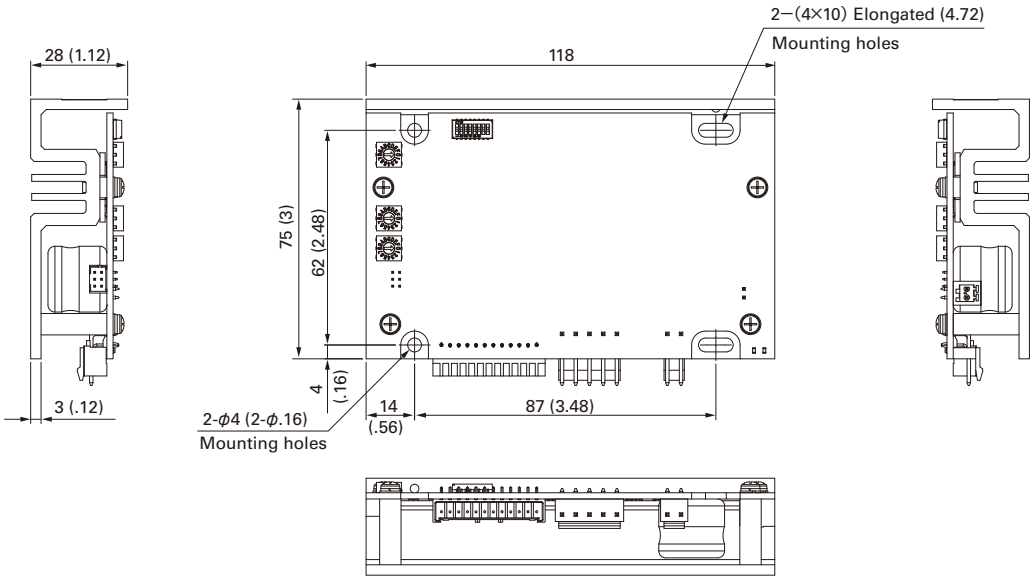
Set model number	Motor model number	Motor + brake length (L)
FSF851S-XB	103F8581-70XB41	116.7 (4.59)
FAF851S-XB FDF851S-XB	103F8581-82XB41	
FSF852S-XB	103F8582-70XB41	146.8 (5.78)
FAF852S-XB FDF852S-XB	103F8582-82XB41	
FSF853S-XB	103F8583-70XB41	180.4 (7.10)

Stepping motor dimensions [Unit : mm (inch)]

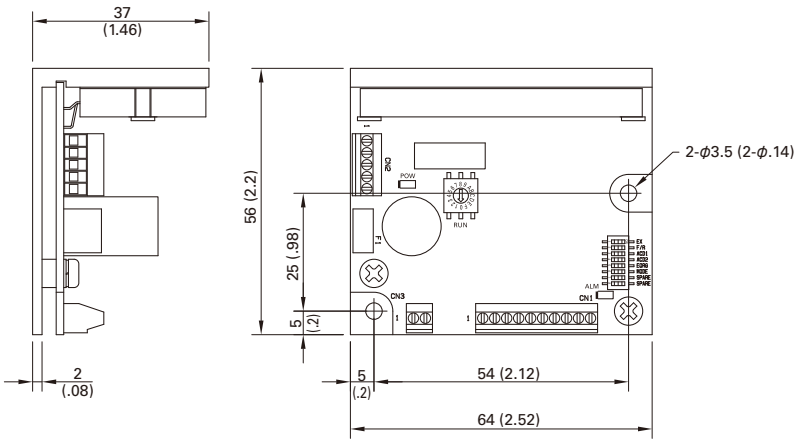
Set model configuration driver (AC input microstep)



Set model configuration driver (DC input microstep)



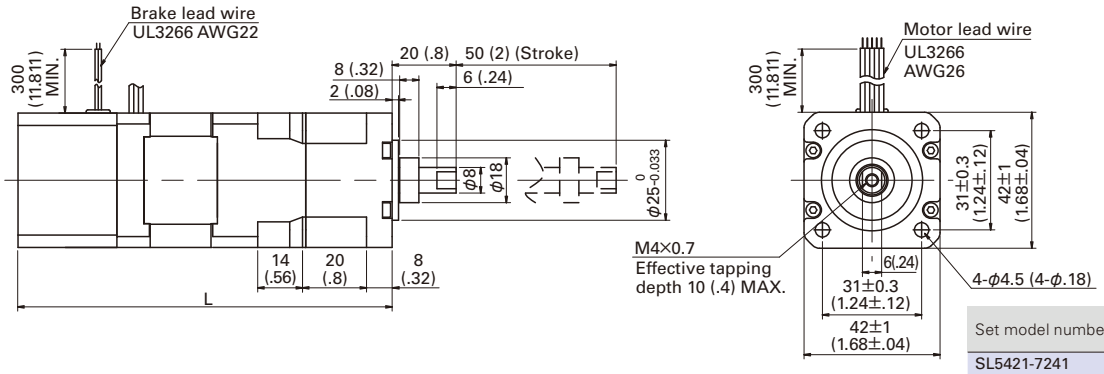
Set model configuration driver (DC input full / half step)



Linear Actuator Stepping Motor dimensions [Unit : mm (inch)]

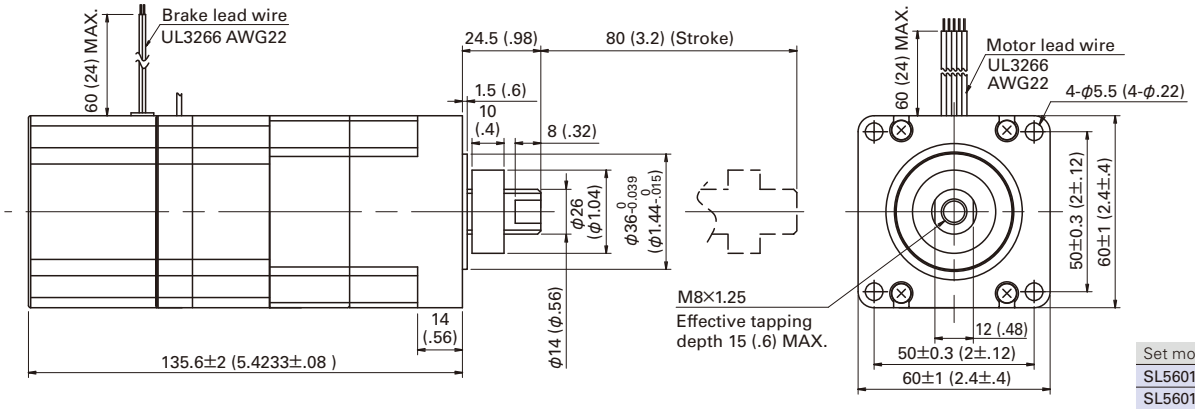
Dimensions for models with electromagnetic brake.

42mm sq. (1.65inch sq.)



Set model number	Brake	Motor + blake length (L) mm (inch)
SL5421-7241	Without	87 ± 2 (3.48 ± .08)
SL5421-72XB41	With	117 ± 2 (4.68 ± .08)

60mm sq. (2.36inch sq.)



Set model number	Brake
SL5601-8241	Without
SL5601-82XB41	With

Safety Consideration

The drivers and stepping motors are the products designed to be used for the general industrial devices.
When using those, pay enough attention to the following points.

- Read the instructions carefully before installation and assembly, to ensure correct usage. Manuals can be downloaded from our website.
- Refrain from modifying or processing the product in any way.
- Consult with the distributor or professional experts for placement or maintenance services of the product.
- In case of the following uses of the product, contact with us for the special care required to the operation, maintenance and management such as multiplexing the system, installing an emergency electric generator set, or so forth.
  - ❶ **Use for the medical devices concerned with a fatal accident.**
  - ❷ **Use for trains, elevators, and so forth that are likely to cause an accident resulting in injury, damage or death.**
  - ❸ **Use in the computer system highly influential to the social life or the public systems.**
  - ❹ **Use in other devices highly influential to maintaining the human safety or the public functions.**

In addition to the above, consult with us for use in such a vibration environment as automobile or transportation.
Make yourself knowledgeable and familiarize with the devices, safety issues and cautions before handling the product.

Indication by (Warning Label) on the product

Either or all of the following indications are given by the Warning Labels depending on the type of the driver or stepping motor.

This label is stuck near the high voltage part such as the electrically charged or cover-protected section, warning that the place where it is likely to cause an electric shock.

This label is stuck near the GND terminals of the driver or stepping motor for which grounding is required, suggesting that the terminals should be actually grounded.

This label is stuck for the driver or stepping motor to which the power source is applied in the voltage exceeding the safety standard, drawing attention against the electric shock.

Safety ranks of the cautions

Following four ranks are provided.

Improper operations or use is most likely to result in serious injury or death.

Improper operations or use is likely to result in average or minor injury, or in property damage.

> In spite of the cautions with the ⚠CAUTION label, it may cause serious results.
> Either the contents of the labels is describing important cautions to be followed inevitably.

Indicates what shall not be done.

Indicates what shall be done.

DANGER

<General matters>

1. Do not use the product in an explosive, flammable or corrosive atmosphere, watery place or near a combustible material. Doing so may cause injury or fire.
2. Have a person with expert knowledge for performing the transportation ,placement,wiring, operation, maintenance or inspection of the product. Without such knowledge, it may cause an electric shock, injury or fire.
3. Do not work for wiring, maintenance servicing or inspection with the electric power on. Perform either of those five minutes after turning the power off, or otherwise, it may cause an electric shock.
4. When the protective functions of the product is activated, turn the power off immediately and eliminate the cause. If continuing the operation without eliminating the cause, the product may operate improperly and cause injury or a breakdown of the system devices.
5. Stepping motor may run out of order at the operating and stopping occasions, depending on the magnitude of the load. Put the product into use after confirming with the adequate trial test operation in the maximum load conditions that the product performs reliable operation. Doing otherwise may cause a breakdown of the system. (Should the product run out of order in the use to drive upward/downward, it may cause a fall of the load.)
6. Do not touch the internal parts of the driver. Doing so may cause an electric shock.

<Wiring>

7. Do not connect the stepping motor directly with the commercial power outlet. Doing so may cause an electric shock, injury or fire. The power shall be supplied to the stepping motor through the driving circuit.
8. Use the electric power source within the rated input voltage. Using otherwise may cause fire or an electric shock.
9. Connect the driver and stepping motor to the ground. Using without grounding may cause an electric shock.
10. Do not harm, forcibly put a stress, or load a heavy article on the cable or get it caught between the articles. Doing so may cause an electric shock.
11. Perform wiring with the power cable as instructed by the wiring diagram or the Operation Manual. Doing otherwise may cause an electric shock or fire.

<Operation>

12. Be sure not to touch the rotating part of the stepping motor during its operation. Touching it may cause injury.
13. Neither reach or touch the electric terminals while electric power is on. Doing so may cause an electric shock.
14. Never disconnect any of the connectors while electric power is on. Doing so may cause an electric shock and corruption.

CAUTION

<General matters>

1. Prior to placement, operation, maintenance servicing or inspection, be sure to read the Operation Manual and follow the instructions to perform those. Failure to follow the instructions may cause an electric shock, injury or fire.
2. Do not use the driver or the stepping motor outside the specified conditions.
   Doing so may cause an electric shock, injury or fire.
3. Do not insert a finger or a thing into the opening of the product. Doing so may cause an electric shock, injury or fire.
4. Do not use the damaged driver or stepping motor. Doing so may cause injury, fire or the like.
5. Use the driver and stepping motor in the designated combination. Using otherwise may cause fire or a trouble.
6. Be careful that the temperature rises in the operating driver, stepping motor or peripheral devices. Failure to be careful may cause a burn.

<Unpacking>

7. Unpack while confirming the ceiling. Failure to do so may cause injury.
8. Confirm if the product is the one having been ordered. Installing an incorrect product may cause a breakdown.

<Wiring>

9. Do not perform measurement of the insulation resistance or withstand insulation voltage of the product. Doing so may cause a breakdown. Instead, contact with us for such inspection.
10. Perform wiring conforming to the technical standards of electric facility or the internal rule. Doing otherwise may cause burning or fire.
11. Ensure that wiring has been correctly done. Operating without correct wiring may cause the stepping motor to run out of control and result in injury.
12. Take insulation process for the attached condenser or the external resistance connection terminals. Failure to do so may cause an electric shock.

<Placement>

13. Do not climb or attach a heavy article on the product. Doing so may cause injury.
14. Neither block nor stuff the aspiration/exhaust vent with a foreign particle. Doing so may cause fire.
15. Follow the instructions for the direction to place. Failure to do so may cause a trouble.
16. Keep a distance as instructed by the Operation Manual for the driver from the inner surface of the control console or other devices. Failure to do so may cause a trouble.
17. Place the product with a great care so as to prevent from the danger such as a tumble or a turnover.
18. Mount the product on an incombustible material such as metal. Doing otherwise may cause fire.
19. Confirm the rotating direction before connecting with the mechanical device. Failure to do so may cause injury or a breakdown.
20. Do not touch the motor output spindle (including the key slot and gears) with a bare hand. Doing so may cause injury.

<Operation>

21. The stepping motor is not equipped with any protective device. Take protective measures using an over-current protective relay, a ground fault interrupter, a protective device from excess temperature, and an emergency stopping device. Failure to do so may cause injury or fire.
22. Do not touch the product for a period after the power is on or has been turned off, since the driver and stepping motor remain in the high temperature. Doing so may cause burns. Especially the temperature rises considerably of the stepping motor depending on the operating conditions. Use the motor on the condition so that its surface temperature becomes 100˚ C or under
23. Stop the operation immediately when an emergency occurs. Failure to do so may cause an electric shock, injury or fire.
24. Do not change adjustment to an extreme, for such a change results in the unstable operation. Doing so may cause injury.
25. When conducting the trial operation, make the stepping motor fixed firmly, and confirm the operation by disconnecting with the mechanical system before connecting with it. Failure to do so may cause injury.
26. When the alarm has been activated, eliminate the cause and ensure the safety to resume operation. Failure to do so may cause injury.
27. When the electric power recovers after the momentary interruption, do not approach the devices because the system may re-start operation by itself. (Set the system so as to secure the safety even when it re-start on such occasion.) Failure to do so may cause injury.
28. Confirm that the electric power supply is all proper conforming to the specifications. Failure to do so may cause a trouble.
29. The brake mechanism of the motor with the electro-magnetic brake is to hold the movable section and the motor position. Do not use it as a safety measure, or doing so may cause the breakdown of the system.
30. Fix the key firmly when operating the motor with key individually. Failure to do so may cause injury.

<Maintenance services>

31. Be careful when performing maintenance services or inspection about the temperature which rises highly in the driver and stepping motor frame. Failure to do so may cause burns.
32. It is recommended to replace the electrolytic condenser of the driver with a new one for securing the preventive measure after using for 5 years, the expected life in the average 40˚ C. The expected life of the fuse and cooling fan motor is 10 years in the average 40˚ C. Thus, the periodical replacement is recommended.
33. Contact with us for repair. If the product is disassembled by the user, it may put it out of action.

<Transportation>

34. Handle the product with care during transportation so as to prevent from the danger such as a tumble or a turnover.
35. Do not hold with the cable or the motor spindle. Doing so may cause a trouble or injury.

<Retirement>

36. When scrapping the driver or stepping motor, treat it for the general industrial waste.

PROHIBITED

<Storage>

1. Avoid the place exposed to rain or water drops, or in an environment with hazardous gas or liquid for storing the product. Failure to do so may cause a trouble.

<Maintenance services>

2. Do not assemble or repair the product. Doing so may cause fire or an electric shock.

<General matters>

3. Do not remove the rating plate.

COMPULSORY

<Storage>

1. Store the product within the specified conservation temperature and humidity in the place not exposed to the sun beam.
2. If the driver has been stored for a long period (3 years or longer for a guide), consult with us. The capacitance may have decreased with the electrolytic condenser due to the long period storage, and it may cause a trouble.

<Operation>

3. Install an external emergency stop circuit to turn the power off for the instant halt of operation.
4. Put the product into operation in the specified ambient temperature and humidity.

<Transportation>

5. Excess loading of the product on the carrier may cause the load to fall in pieces. Follow the instructions given outside the package.

Inquiry Check Sheet

For more information regarding any products or services described here in, please contact your nearest office listed on the back of this catalog.

To SANYO DENKI Co.,LTD.　　Date：

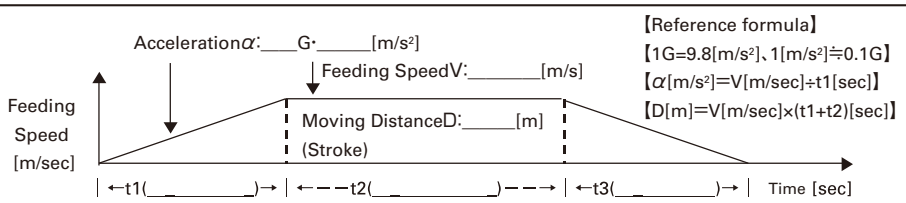
Company:

Department:

Name:

Tel:　　FAX:

E-mail:

	Item	Contents
❶	Name of target equipment	Equipment name, category (transport, processing, test, other)
❷	Name of servo axis	Axis name, axial mechanism (horizontal/vertical), brake mechanism (yes/no)
❸	Current condition of above axis	Manufacturer Name (　) Series Name (　) Motor Capacity (　) Hydraulic, Mechanical, or New System (　)
❹	Positioning accuracy	±　mm·±　μm
❺	Operation pattern	 【Reference formula】 【1G=9.8[m/s²]、1[m/s²]≒0.1G】 【α[m/s²]=V[m/sec]÷t1[sec]】 【D[m]=V[m/sec]×(t1+t2)[sec]】
❻	Mechanism	Ball-screw/screw-rotation type (horizontal/vertical), ball-screw/nut-rotation type (horizontal/vertical), rack and pinion (horizontal/vertical), belt/chain (horizontal/vertical), rotary table, roll feed, other
❼	Mechanical structure	WT(table mass) kg　WL(work mass) kg　WA(mass of other drive parts) kg WR(rack mass) kg　WB(belt/chain mass) kg　WC(counterbalance mass) kg Fa(external force axial direction) N　Fb(ball-screw preload) N　T(roll pushing force) N Dr1(drive-side roll diameter) mm　Dr2(follower-side roll diameter) mm Lr1(drive-side roll length) mm　Lr2(follower-side roll length) mm　G(reduction ratio) JG(speed-reducer inertia) kg·m²　JC(coupling inertia) kg·m² JN(nut inertia) kg·m²　JO(other motor-axis conversion inertia) kg·m² Db(ball-screw diameter) mm　Lb(ball-screw axial length) mm　Pb(ball -screw lead) mm Dp(pinion/pulley diameter) mm　Lp(pinion axial length) mm　tp(pully thickness) mm Dt(table diameter) mm　Dh(table-support dianeter) mm　LW(load shift from axis) mm Ds(table shaft diameter) mm　Ls(table shaft length) mm ρ(specific gravity of ball-screw/pinion/pulley/table-shaft material) kg·cm³ μ(friction coefficient between sheet and shiliding-surface/support-section/roll)　ρ1(specific gravity of roll-1 material) kg／cm³ ρ2(specific gravity of roll-2 material) kg／cm³　κ(internal friction coefficient of preload nut) η(mechanical efficiency)　JL(load inertia of motor-axis conversion) kg·m² TF(friction torque of motor axis conversion) N·m　Tu(imbalance torque of motor axis conversion) N·m
❽	Speed reducer	Customer-provided (　／　)·Sanyo denki standard(planet/spur/no-backlash-planet　／　) other(　／　)
❾	Encoder type	Encoder type specified (yes / no) Yes:(Wiring saving incremental encoder, battery backup absolute encoder, absolute encoder for incremental system, battery-less absolute encoder) Resolution(　)
❿	Input format	Position , velocity , torque , other (　)
⓫	Host equipment (controller)	Sequencer , laptop , customer-developed product , Sanyo dennki-provided , other (　)
⓬	Usage environment and other requirements	Cutting , clean-room use , anti-dust measures , other (　)
⓭	Estimated production	Single product: (　) units/mouth (　) units/year
⓮	Development schedule	Prototype period: (　)Year (　) Month Production period: (　)Year (　) Month
⓯	Various measures	Related documentation (already submitted; send later by mail) Visit/PR desired (yes / no) Meeting desired (yes / no)
⓰	Miscellaneous (questions, pending problems, unresolved issues, etc.)	

MEMO

■ Precautions For Adoption

Failure to follow the precautions on the right may cause moderate injury and property damage, or in some circumstances, could lead to a serious accident. Always follow all listed precautions.

⚠ Cautions

- Read the accompanying Instruction Manual carefully prior to using the product.
- If applying to medical devices and other equipment affecting people's lives, please contact us beforehand and take appropriate safety measures.
- If applying to equipment that can have significant effects on society and the general public, please contact us beforehand.
- Do not use this product in an environment where vibration is present, such as in a moving vehicle or shipping vessel.
- Do not perform any retrofitting, re-engineering, or modification to this equipment.
- The products presented in this catalog are meant to be used for general industrial applications. If using for special applications related to aviation and space, nuclear power, electric power, submarine repeaters, etc., please contact us beforehand.

*For any question or inquiry regarding the above, contact our Sales Department.

http://www.sanyodenki.com

SANYO DENKI CO., LTD.
3-33-1, Minami-Otsuka, Toshima-ku, Tokyo, 170-8451, Japan
TEL: +81 3 5927 1020

SANYO DENKI *AMERICA, INC.*
468 Amapola Avenue Torrance, CA 90501, U.S.A.
TEL: +1 310 783 5400

SANYO DENKI *EUROPE SA.*
P.A. Paris Nord Ⅱ, 48 Allée des Erables-VILLEPINTE, BP.57286, F-95958 ROISSY CDG Cedex, France
TEL: +33 1 48 63 26 61

SANYO DENKI *GERMANY GmbH*
Frankfurter Strasse 92, 65760 Eschborn, Germany
TEL: +49 6196 76113 0

SANYO DENKI *KOREA CO., LTD.*
9F 5-2, Sunwha-dong Jung-gu Seoul, 100-130, Korea
TEL: +82 2 773 5623

SANYO DENKI *SHANGHAI CO., LTD.*
Room 2106-2109, Bldg A, Far East International Plaza, No.319, Xianxia Road, Shanghai, 200051, China
TEL: +86 21 6235 1107

SANYO DENKI *TAIWAN CO., LTD.*
Room 1208, 12F, No.96 Chung Shan N, Road, Sec.2, Taipei 104, Taiwan, R.O.C.
TEL: +886 2 2511 3938

SANYO DENKI *(H.K.)CO., LIMITED*
Room 2305, 23/F, South Tower, Concordia Plaza, 1 Science Museum Road, TST East, Kowloon, Hong Kong
TEL: +852 2312 6250

SANYO DENKI *SINGAPORE PTE. LTD.*
10, Hoe Chiang Road, #14-03A/04, Keppel Towers, Singapore 089315
TEL: +65 6223 1071

*Remarks : Specifications Are SubjectTo Change Without Notice.

CATALOG No. S0834B012 '14.5.IT

SANMOTION

CLOSED LOOP STEPPING SYSTEMS

Model No.PB

Ver.6

SANYO DENKI

SANMOTION
CLOSED LOOP STEPPING SYSTEMS

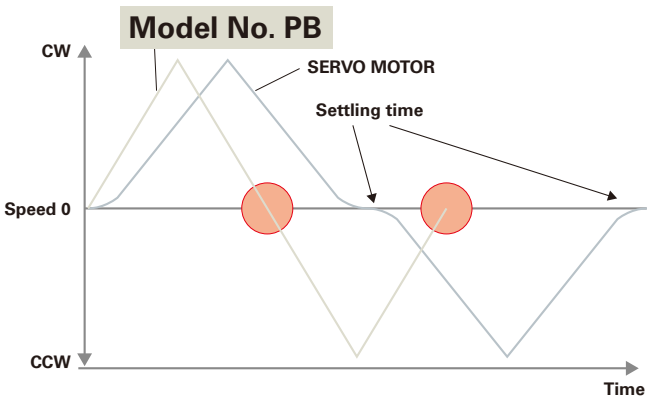
Model No.PB

Hybrid system combining the ease-of-use of stepping motors with the reliability of servomotors.

MERIT 1

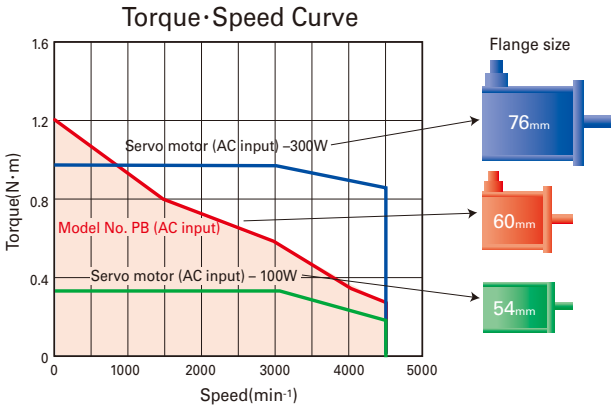
Increased System Speed and Smaller System Size

High Speed Positioning



High torque performance in the low speed range delivers shorter positioning time for short stroke at high hit rate applications.

Smaller System Size



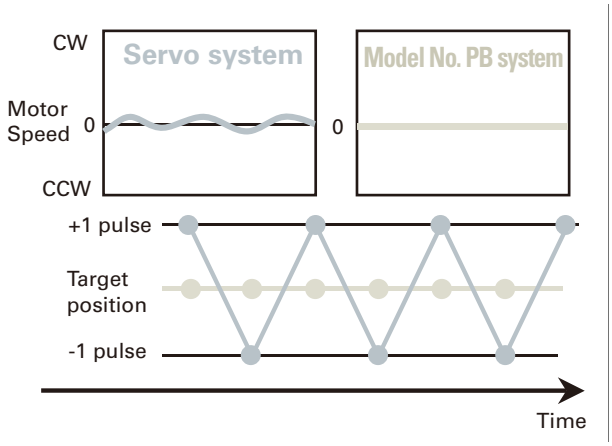
Smaller system size is achievable for low speed applications due to the availablity of higher torque performance in the low speed range as compared to conventional servomotors With the AC power input type, motor torque has been increased by 50% compared with our conventional product.

AC Power Input	DC Power Input
AC Type R General Purpose I/O Input Type (RS-485 + Parallel IO)	DC Type M Multiple Input Type (General Purpose I/O Input + Pulse-Train Input)
AC Type P Pulse-Train Input Type	DC Type R Multi Axis General Purpose I/O Input Type (RS-485 + Parallel IO)

MERIT 2

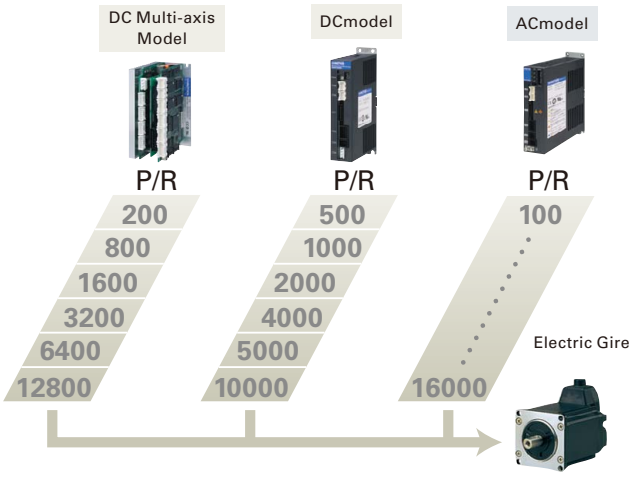
Stable Stand-Still

Stable Stand-Still



Complete stand-still motion is possible due to the availability of holding torque, a typical characteristic of stepping motors. With the AC power input type, a compensator function is built in to prevent position aberration from occurring due to load variation.

High Resolution

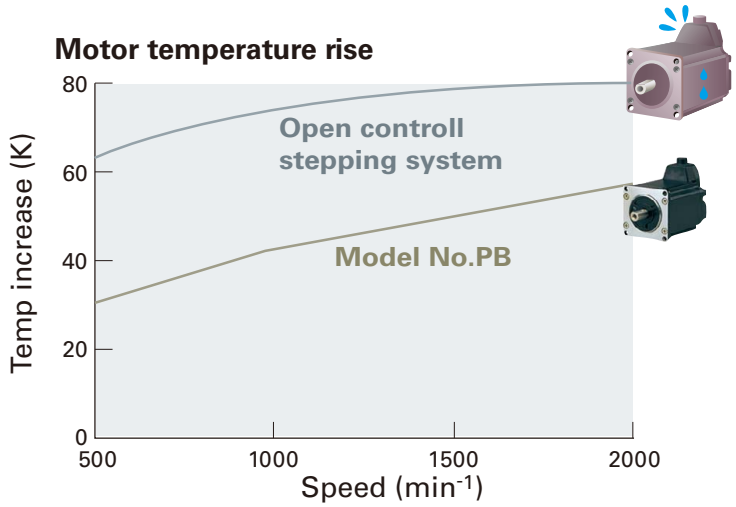


Able to set high resolutions. The AC model comes with electronic gear and enables users to set any resolution, according to the device.

MERIT 3

Energy-Saving

Improved Efficiency from Current Control



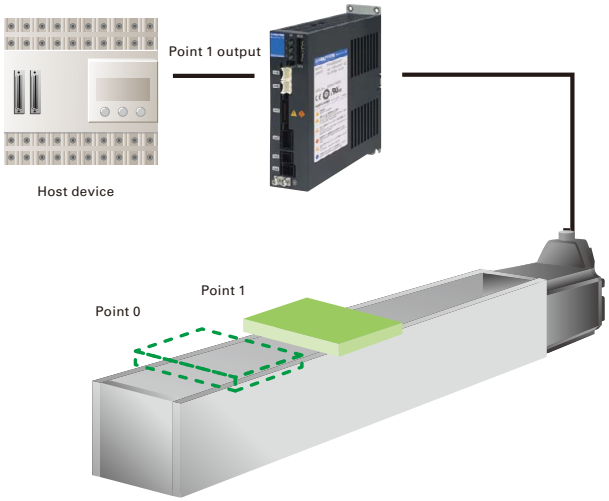
Higher efficiency from low heat generation is achieved by controlling the current flow to motor according to motor load With the AC power input type, motor heat generation has been reduced for 60% compared with our conventional product.

MERIT 4

Simplified Control

General Purpose I/O Input

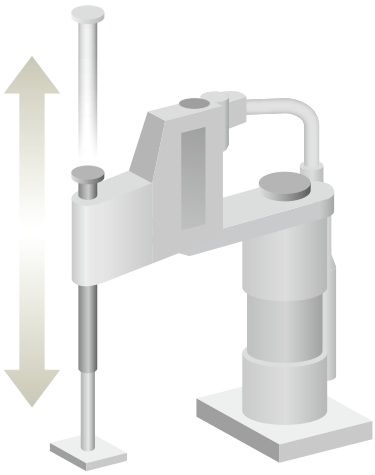
AC Type R | DC Type M | DC Type R Multi Axis



System can be easily controlled by using the general purpose I/O to designate preset point or program numbers. (AC Type R, DC Type M: 128 point DC Type R Multi-axis: 256 point)

Support For Various Operations

AC Type R | DC Type M | DC Type R Multi Axis

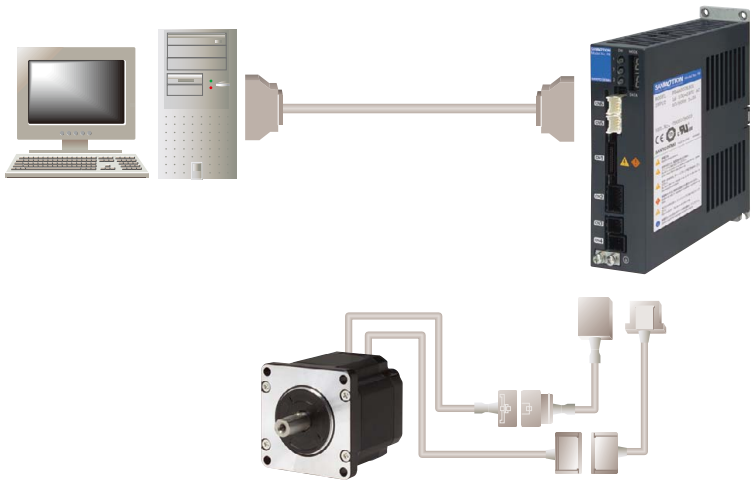


Comprehensive built-in amplifier functionality includes thrust control, point designation, programming, homing, holding brake control and sensor limit input.

MERIT 5

Reduced System Design Cost and Time

Wide Availability of Optional Cables and Connectors



Cables and connectors for controller/amplifier and amplifier/motor connection are available for hassle-free setup.

AC Power Input

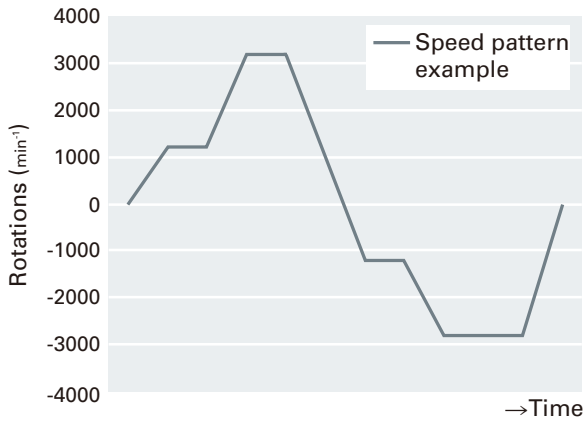
- AC Type R — General Purpose I/O Input Type (RS-485 + Parallel IO)
- AC Type P — Pulse-Train Input Type

DC Power Input

- DC Type M — Multiple Input Type (General Purpose I/O Input + Pulse-Train Input)
- DC Type R Multi Axis — General Purpose I/O Input Type (RS-485 + Parallel IO)

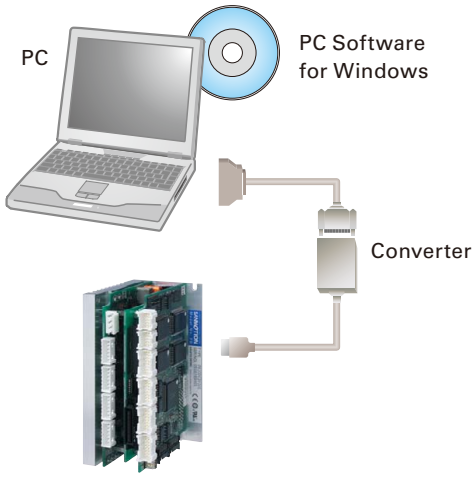
Built-in Pulse Generation Function

AC Type R | DC Type M | DC Type R Multi Axis



A built-in pulse generation function is included in the Model No. PB Types R and M. The amplifier receives speed, acceleration/deceleration and distance as numeric data from the upper-level device, and automatically generates an optimal speed pattern according to the commands internally.Since no separate pulse generator is required, this contributes to lower system cost.

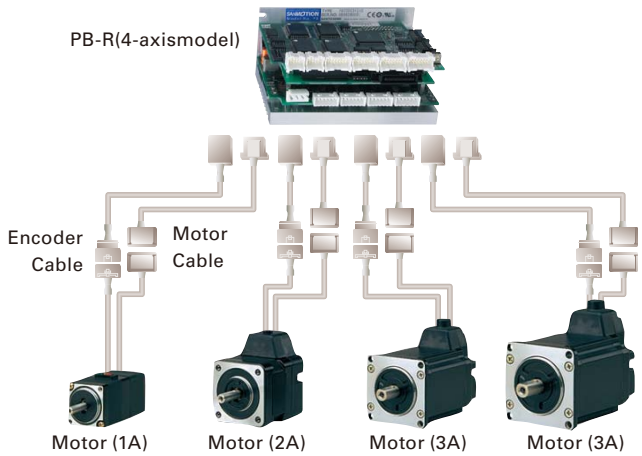
PC Interface



Parameter setting, data editing and monitoring of position and speed can be done on a PC using the bundled setup software.

Multi-Axis Type (DC Power Input)

DC Type R Multi Axis



Multi-axis systems can be reduced in size and weight using the PB-R 4-axis type.
✻1,2,3A can be selected using software switches.

MERIT 6

Complies with International Safety Standards

✻UL·CE compliant motors have model numbers ending with "-M".

Extensive Closed-Loop Stepping System Lineup

Wide Variety of Amplifiers Available

	Point command control with upper level device such as PLC	Network control with serial communication (RS-485 standard)	Control with pulse generator
AC Power Source	**Type R** ▶ **P13**  ● Startup via I/O Startup preset points or programs in the amplifier memory using the I/O. ● Startup via Serial Communication Control by transmitting speed, acceleration/deceleration and distance data via serial communication.		**Type P** ▶ **P19**  ● With pulse control: Motion is generated by responding to pulse input commands from a host device.
DC Power Source	**Type M** ▶ **P25**  ● Startup via I/O Startup preset points or programs in the amplifier memory using the I/O. ● Startup via Serial Communication Control by transmitting speed, acceleration/deceleration and distance data via serial communication. ● With pulse control: Motion is generated by responding to pulse input commands from a host device.		
	Type R Multi-Axis ▶ **P31**  ● Startup via I/O Startup preset points or programs in the amplifier memory using the I/O. ● Startup via Serial Communication Control by transmitting speed, acceleration/deceleration and distance data via serial communication.		

Set Models with a Wide Range of Motors and Amplifiers

AC Power Source **DC Power Source**

□00 The values inside the illustration indicate the motor's flange angle size (unit: mm)

Standard Model ▶P37

The standard model includes an amplifier and a motor

AC □42 □60 □86 ▶P37

DC □28 □42 □60 ▶P39

Low-backlash Gear Model ▶P41

This model includes a low-backlash gear that engages the final stage with a tapered gear.

AC □42 □60 ▶P41, 43

DC □42 □60 ▶P45, 47

REDUCTION GEAR RATIO 1/3.6 1/7.2 1/10 1/20 1/30

Harmonic Gear Model ▶P49

The reduction harmonic gear provides high torque and eliminates backlash.

AC □42 □60 ▶P49

DC □28 □42 □60 ▶P51, 53

REDUCTION GEAR RATIO 1/30 1/50 1/100

Electromagnetic Brake Model ▶P54

This model uses a non-excitation electromagnetic brake, capable of maintaining positionand supporting a load in vertical operation, even when power is off

AC □42 □60 ▶P54

DC □28 □42 □60 ▶P55

DC Power Source

Spur Gear Model ▶P57

This model utilizes a spur gear design for gear reduction.

DC □28 ▶P57

REDUCTION GEAR RATIO 1/3.6 1/7.2 1/10 1/20 1/30 1/50

Model Nomenclature

❑ System Model Nomenclature

Note 1: No symbol indicates no options.
✻ Power (1m) and I/O (1m) cables are included in the set models.

PB	B	R	60	3	-	C	3.6	B

- Motor Option 3: Holding Brake (B: included) Note1
- Motor Option 2: Gear Ratio Note1
- Motor Option 1: Gear Specifications Note1
- Motor Length
- Motor Flange Size (mm)
- Interface Type R: RS-485 + parallel I/O P: Pulse Stream M: Multi
- Power Input B: Single-phase AC100V to 115V
  C: Single-phase, 3-phase shared use AC200V to 230V
  D: DC Power Source
- System Name PB: Model No.PB System

❑ Amplifier Model Nomenclature

PB3	D	003	M	2	00

- Specification Identification 00: Standard
- Encoder Type 1: 200P/R INC 2: 500P/R INC 3: 4000P/R INC
- Interface Type R: RS-4855 + parallel I/O P: Pulse Stream M: Multi
- Motor Excitation Current 001: 1A 002: 2A 003: 3A
- Power Input A: AC Power Source D: DC Power Source
- Series Name PB□: Model No.PB Amplifier

❑ Motor Model Nomenclature

PBM 60 3 F X K 20 - M

- UL·CE
- Specification Identification 20: Standard
- Encoder Type K: 4000P/R with C-phase output
  E: 500P/R with C-phase output
  A: 200P/R No C-phase output
  C: 200P/R with C-phase output
  (DC (Multi-axis) only)
- Options ✻Contact us for assistance
  X : without option
  C : 24V DC Break
  GA to GL : with Gear
  HJ to HM : with Harmonic Gear
- Power Input F: AC Power Source, DC Power Source (Single-axis)
  D: DC Power Source (Multi-axis)
- Motor Length
- Motor Flange Size (mm)
- Series Name PBM: Model No.PB Motor

✻Please enquire separately for the sizes of PBM503 and PBM565.

❑ Cable Model Nomenclature

PBC 6 P 0010 A

- Specification Identification
- 0000: Connector Set
- 0003: Cable Length 30cm
- 0010: Cable Length 1m
- 0030: Cable Length 3m
- Cable Type P: Power supply M: Motor E: Encoder
  S: I/O C: Communication
- Control Number
- Series Name PBC:PB Cable/Connector Set

List of Amplifier/Motor Combinations and Optional Products

Motor Size	Amplifier Model No.		PB4A002R300 PB4A002R301	PB4A002P300 PB4A002P301	PB3D003M200 PB3D003M201	PB2D003R1U0 PB2D003R1U1 PB2D003R1U2 PB2D003R1U3
	Interface Type		RS-485 (Type R)	Pulse-Train (Type P)	RS-485 and Pulse-Train (Type M)	RS-485(Type R)
	Encoder Resolution		4000×4 Subdivisions=16000P/R	4000×4 Subdivisions=16000P/R	500×4 Subdivisions=2000P/R	200×4Subdivisions=800P/R
□28mm	Standard				PBM282FXE20	PBM282DXA20
					PBM284FXE20	PBM284DXA20
	Spur Gear	1/3.6			PBM282FGAE20	PBM282DGAA20
		1/7.2			PBM282FGBE20	PBM282DGBA20
		1/10			PBM282FGEE20	PBM282DGEA20
		1/20			PBM282FGGE20	PBM282DGGA20
		1/30			PBM282FGJE20	PBM282DGJA20
		1/50			PBM282FGLE20	PBM282DGLA20
	Harmonic Gear	1/50			PBM282FHLE20	PBM282DHLA20
		1/100			PBM282FHME20	PBM282DHMA20
	Electromagnetic Brake				PBM282FCE20	PBM282DCA20
					PBM284FCE20	PBM284DCA20
□42mm	Standard		PBM423FXK20-M		PBM423FXE20	PBM423DXA20
	Low-backlash Gear	1/3.6	PBM423FGAK20-M		PBM423FGAE20	PBM423DGAA20
		1/7.2	PBM423FGBK20-M		PBM423FGBE20	PBM423DGBA20
		1/10	PBM423FGEK20-M		PBM423FGEE20	PBM423DGEA20
		1/20	PBM423FGGK20-M		PBM423FGGE20	PBM423DGGA20
		1/30	PBM423FGJK20-M		PBM423FGJE20	PBM423DGJA20
	Harmonic Gear	1/30	PBM423FHJK20-M		PBM423FHJE20	PBM423DHJA20
		1/50	PBM423FHLK20-M		PBM423FHLE20	PBM423DHLA20
		1/100	PBM423FHMK20-M		PBM423FHME20	PBM423DHMA20
	Electromagnetic Brake		PBM423FCK20-M		PBM423FCE20	PBM423DCA20
□60mm	Standard		PBM603FXK20-M		PBM603FXE20	PBM603DXA20
			PBM604FXK20-M		PBM604FXE20	PBM604DXA20
	Low-backlash Gear	1/3.6	PBM603FGAK20-M		PBM603FGAE20	PBM603DGAA20
		1/7.2	PBM603FGBK20-M		PBM603FGBE20	PBM603DGBA20
		1/10	PBM603FGEK20-M		PBM603FGEE20	PBM603DGEA20
		1/20	PBM603FGGK20-M		PBM603FGGE20	PBM603DGGA20
		1/30	PBM603FGJK20-M		PBM603FGJE20	PBM603DGJA20
	Harmonic Gear	1/50	PBM603FHLK20-M		PBM603FHLE20	PBM603DHLA20
		1/100	PBM603FHMK20-M		PBM603FHME20	PBM603DHMA20
	Electromagnetic Brake		PBM603FCK20-M		PBM603FCE20	PBM603DCA20
			PBM604FCK20-M		PBM604FCE20	PBM604DCA20
□86mm	Standard		PBM861FXK20-M			
			PBM862FXK20-M			
Options	Power Cable		PBC8P0010A		PBC6P0010A	
	Motor Ext. Cable		PBC7M0030A		PBC6M0030A	PBC4M0030A
	Encoder Ext. Cable		PBC7E0030A		PBC6E0030A	PBC5E0030A PBC5E0030C
	I/O Cable		PBC5S0010A (un shielded) PBC5S0010C (shield)		PBC5S0010A (un shielded) PBC5S0010C (shield)	PBC4S0010A (un shielded)
	Communication Cable Note 1)		PBC6C0003A	Not required	PBC6C0003A	PBC4C0003A
	PC I/F Software		SPBALL-01		SPBA1W-01	SPBD2W-01
	USB / RS-485 Converter Unit		PBFM-U6			
	Regenerative Unit					PBFE-01

Note 1) Used when amplifiers with several axes are connected via a daisy chain connection by telecommunication.

Motor Option Combination Table

	Motor Option Combination Table		
Motor No	Gear Box	Harmonic Gear	Electromagnetic Brake
PBM282F□E20 / PBM282D□A20	✓	✓	✓
PBM284F□E20 / PBM284D□A20	–	–	✓
PBM423F□E20 / PBM423F□K20 / PBM423D□A20	✓	✓	✓
PBM603F□E20 / PBM603F□K20 / PBM603D□A20	✓	✓	✓
PBM604F□E20 / PBM604F□K20 / PBM604D□A20	–	–	✓

Motor Standard Specifications (common to all models)

Motor No.	PBM423F, PBM603F, PBM604F, PBM861F, PBM862F	PBM282D, PBM282F, PBM284D, PBM284F, PBM423D, PBM603D, PBM604D
Insulation class	Class B (130°C). UL compliant products are certified with Class A (105°C).	
Withstand Voltage ✻	AC1500V 50/60Hz 1minute	AC500V 50/60Hz 1minute
Insulation resistance ✻	DC500V 100MΩMIN.	
Degrees of protection	IP40	
Vibration resistance	15G(Frequency range 10 to 70Hz amplitude 1.52mm 70 to 2000 acceleration 15G) The x, y, and z are each tested 12 times with a sweep time of 15 minutes/cycle	
Impact resistance	30G(half sine wave with 11 ms duration) The x, y and z are each tested three times for each direction for a total of 18 tests.	
Ambient temperature	–10°C to +40°C (Harmonic Gear Model 0°C to +40°C)	
Ambient humidity	20 to 90%RH (No Condensation)	
Elevation	Maximum 1000m above sea level	

✻ The user should not test the insulation resistance or insulation withstand voltage, because a capacitor has been inserted between the encoder output groundline and the frame to prevent noise.

Set Model Configurations

AC Power Source Universal Input Type RS-485 + Parallel I/O (Type R)

Model	Motor Flange Size	Reduction Gear Ratio	Power Source	Set Model No.	Set Accessories		
					Amplifier Model No.	Motor Model No.	Power Cable・I/O Cable
Standard Model	□42mm	–	Single-phase AC 100 to 115V	**PBBR423**	PB4A002R300	PBM423FXK20-M	Power Cable (1m): PBC8P0010A I/O Cable (1m): PBC5S0010A
			Single-phase/three-phase AC 200 to 230V	**PBCR423**	PB4A002R301	PBM423FXK20-M	
	□60mm	–	Single-phase AC 100 to 115V	**PBBR603**	PB4A002R300	PBM603FXK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR603**	PB4A002R301	PBM603FXK20-M	
			Single-phase AC 100 to 115V	**PBBR604**	PB4A002R300	PBM604FXK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR604**	PB4A002R301	PBM604FXK20-M	
	□86mm	–	Single-phase AC 100 to 115V	**PBBR861**	PB4A002R300	PBM861FXK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR861**	PB4A002R301	PBM861FXK20-M	
			Single-phase AC 100 to 115V	**PBBR862**	PB4A002R300	PBM862FXK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR862**	PB4A002R301	PBM862FXK20-M	
Low-backlash Gear Model	□42mm	1/3.6	Single-phase AC 100 to 115V	**PBBR423-C3.6**	PB4A002R300	PBM423FGAK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR423-C3.6**	PB4A002R301	PBM423FGAK20-M	
		1/7.2	Single-phase AC 100 to 115V	**PBBR423-C7.2**	PB4A002R300	PBM423FGBK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR423-C7.2**	PB4A002R301	PBM423FGBK20-M	
		1/10	Single-phase AC 100 to 115V	**PBBR423-C10**	PB4A002R300	PBM423FGEK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR423-C10**	PB4A002R301	PBM423FGEK20-M	
		1/20	Single-phase AC 100 to 115V	**PBBR423-C20**	PB4A002R300	PBM423FGGK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR423-C20**	PB4A002R301	PBM423FGGK20-M	
		1/30	Single-phase AC 100 to 115V	**PBBR423-C30**	PB4A002R300	PBM423FGJK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR423-C30**	PB4A002R301	PBM423FGJK20-M	
	□60mm	1/3.6	Single-phase AC 100 to 115V	**PBBR603-C3.6**	PB4A002R300	PBM603FGAK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR603-C3.6**	PB4A002R301	PBM603FGAK20-M	
		1/7.2	Single-phase AC 100 to 115V	**PBBR603-C7.2**	PB4A002R300	PBM603FGBK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR603-C7.2**	PB4A002R301	PBM603FGBK20-M	
		1/10	Single-phase AC 100 to 115V	**PBBR603-C10**	PB4A002R300	PBM603FGEK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR603-C10**	PB4A002R301	PBM603FGEK20-M	
		1/20	Single-phase AC 100 to 115V	**PBBR603-C20**	PB4A002R300	PBM603FGGK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR603-C20**	PB4A002R301	PBM603FGGK20-M	
		1/30	Single-phase AC 100 to 115V	**PBBR603-C30**	PB4A002R300	PBM603FGJK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR603-C30**	PB4A002R301	PBM603FGJK20-M	
Harmonic Gear Model	□42mm	1/30	Single-phase AC 100 to 115V	**PBBR423-H30**	PB4A002R300	PBM423FHJK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR423-H30**	PB4A002R301	PBM423FHJK20-M	
		1/50	Single-phase AC 100 to 115V	**PBBR423-H50**	PB4A002R300	PBM423FHLK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR423-H50**	PB4A002R301	PBM423FHLK20-M	
		1/100	Single-phase AC 100 to 115V	**PBBR423-H100**	PB4A002R300	PBM423FHMK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR423-H100**	PB4A002R301	PBM423FHMK20-M	
	□60mm	1/50	Single-phase AC 100 to 115V	**PBBR603-H50**	PB4A002R300	PBM603FHLK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR603-H50**	PB4A002R301	PBM603FHLK20-M	
		1/100	Single-phase AC 100 to 115V	**PBBR603-H100**	PB4A002R300	PBM603FHMK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR603-H100**	PB4A002R301	PBM603FHMK20-M	
Electromagnetic Brake Model	□42mm	–	Single-phase AC 100 to 115V	**PBBR423-B**	PB4A002R300	PBM423FCK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR423-B**	PB4A002R301	PBM423FCK20-M	
	□60mm	–	Single-phase AC 100 to 115V	**PBBR603-B**	PB4A002R300	PBM603FCK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR603-B**	PB4A002R301	PBM603FCK20-M	
			Single-phase AC 100 to 115V	**PBBR604-B**	PB4A002R300	PBM604FCK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCR604-B**	PB4A002R301	PBM604FCK20-M	

Option Product Model Numbers (Not Included in Set Models)

Motor Ext. Cable	PBC7M0030A
Encoder Ext. Cable	PBC7E0030A
Communication Cable	PBC6C0003A
PC I/F Software	SPBALL-01
USB / RS-485 Converter Unit	PBFM-U6

AC Power Source Pulse Train Input Type (Type P)

Model	Motor Flange Size	Reduction Gear Ratio	Power Source	Set Model No.	Set Accessories		
					Amplifier Model No.	Motor Model No.	Power Cable・I/O Cable
Standard Model	□42mm	–	Single-phase AC 100 to 115V	**PBBP423**	PB4A002P300	PBM423FXK20-M	Power Cable (1m): PBC8P0010A I/O Cable (1m): PBC5S0010C
			Single-phase/three-phase AC 200 to 230V	**PBCP423**	PB4A002P301	PBM423FXK20-M	
	□60mm	–	Single-phase AC 100 to 115V	**PBBP603**	PB4A002P300	PBM603FXK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP603**	PB4A002P301	PBM603FXK20-M	
			Single-phase AC 100 to 115V	**PBBP604**	PB4A002P300	PBM604FXK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP604**	PB4A002P301	PBM604FXK20-M	
	□86mm	–	Single-phase AC 100 to 115V	**PBBP861**	PB4A002P300	PBM861FXK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP861**	PB4A002P301	PBM861FXK20-M	
			Single-phase AC 100 to 115V	**PBBP862**	PB4A002P300	PBM862FXK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP862**	PB4A002P301	PBM862FXK20-M	
Low-backlash Gear Model	□42mm	1/3.6	Single-phase AC 100 to 115V	**PBBP423-C3.6**	PB4A002P300	PBM423FGAK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP423-C3.6**	PB4A002P301	PBM423FGAK20-M	
		1/7.2	Single-phase AC 100 to 115V	**PBBP423-C7.2**	PB4A002P300	PBM423FGBK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP423-C7.2**	PB4A002P301	PBM423FGBK20-M	
		1/10	Single-phase AC 100 to 115V	**PBBP423-C10**	PB4A002P300	PBM423FGEK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP423-C10**	PB4A002P301	PBM423FGEK20-M	
		1/20	Single-phase AC 100 to 115V	**PBBP423-C20**	PB4A002P300	PBM423FGGK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP423-C20**	PB4A002P301	PBM423FGGK20-M	
		1/30	Single-phase AC 100 to 115V	**PBBP423-C30**	PB4A002P300	PBM423FGJK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP423-C30**	PB4A002P301	PBM423FGJK20-M	
	□60mm	1/3.6	Single-phase AC 100 to 115V	**PBBP603-C3.6**	PB4A002P300	PBM603FGAK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP603-C3.6**	PB4A002P301	PBM603FGAK20-M	
		1/7.2	Single-phase AC 100 to 115V	**PBBP603-C7.2**	PB4A002P300	PBM603FGBK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP603-C7.2**	PB4A002P301	PBM603FGBK20-M	
		1/10	Single-phase AC 100 to 115V	**PBBP603-C10**	PB4A002P300	PBM603FGEK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP603-C10**	PB4A002P301	PBM603FGEK20-M	
		1/20	Single-phase AC 100 to 115V	**PBBP603-C20**	PB4A002P300	PBM603FGGK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP603-C20**	PB4A002P301	PBM603FGGK20-M	
		1/30	Single-phase AC 100 to 115V	**PBBP603-C30**	PB4A002P300	PBM603FGJK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP603-C30**	PB4A002P301	PBM603FGJK20-M	
Harmonic Gear Model	□42mm	1/30	Single-phase AC 100 to 115V	**PBBP423-H30**	PB4A002P300	PBM423FHJK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP423-H30**	PB4A002P301	PBM423FHJK20-M	
		1/50	Single-phase AC 100 to 115V	**PBBP423-H50**	PB4A002P300	PBM423FHLK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP423-H50**	PB4A002P301	PBM423FHLK20-M	
		1/100	Single-phase AC 100 to 115V	**PBBP423-H100**	PB4A002P300	PBM423FHMK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP423-H100**	PB4A002P301	PBM423FHMK20-M	
	□60mm	1/50	Single-phase AC 100 to 115V	**PBBP603-H50**	PB4A002P300	PBM603FHLK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP603-H50**	PB4A002P301	PBM603FHLK20-M	
		1/100	Single-phase AC 100 to 115V	**PBBP603-H100**	PB4A002P300	PBM603FHMK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP603-H100**	PB4A002P301	PBM603FHMK20-M	
Electromagnetic Brake Model	□42mm	–	Single-phase AC 100 to 115V	**PBBP423-B**	PB4A002P300	PBM423FCK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP423-B**	PB4A002P301	PBM423FCK20-M	
	□60mm	–	Single-phase AC 100 to 115V	**PBBP603-B**	PB4A002P300	PBM603FCK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP603-B**	PB4A002P301	PBM603FCK20-M	
			Single-phase AC 100 to 115V	**PBBP604-B**	PB4A002P300	PBM604FCK20-M	
			Single-phase/three-phase AC 200 to 230V	**PBCP604-B**	PB4A002P301	PBM604FCK20-M	

Option Product Model Numbers (Not Included in Set Models)

Motor Ext. Cable	PBC7M0030A
Encoder Ext. Cable	PBC7E0030A
PC I/F Software	SPBALL-01
USB / RS-485 Converter Unit	PBFM-U6

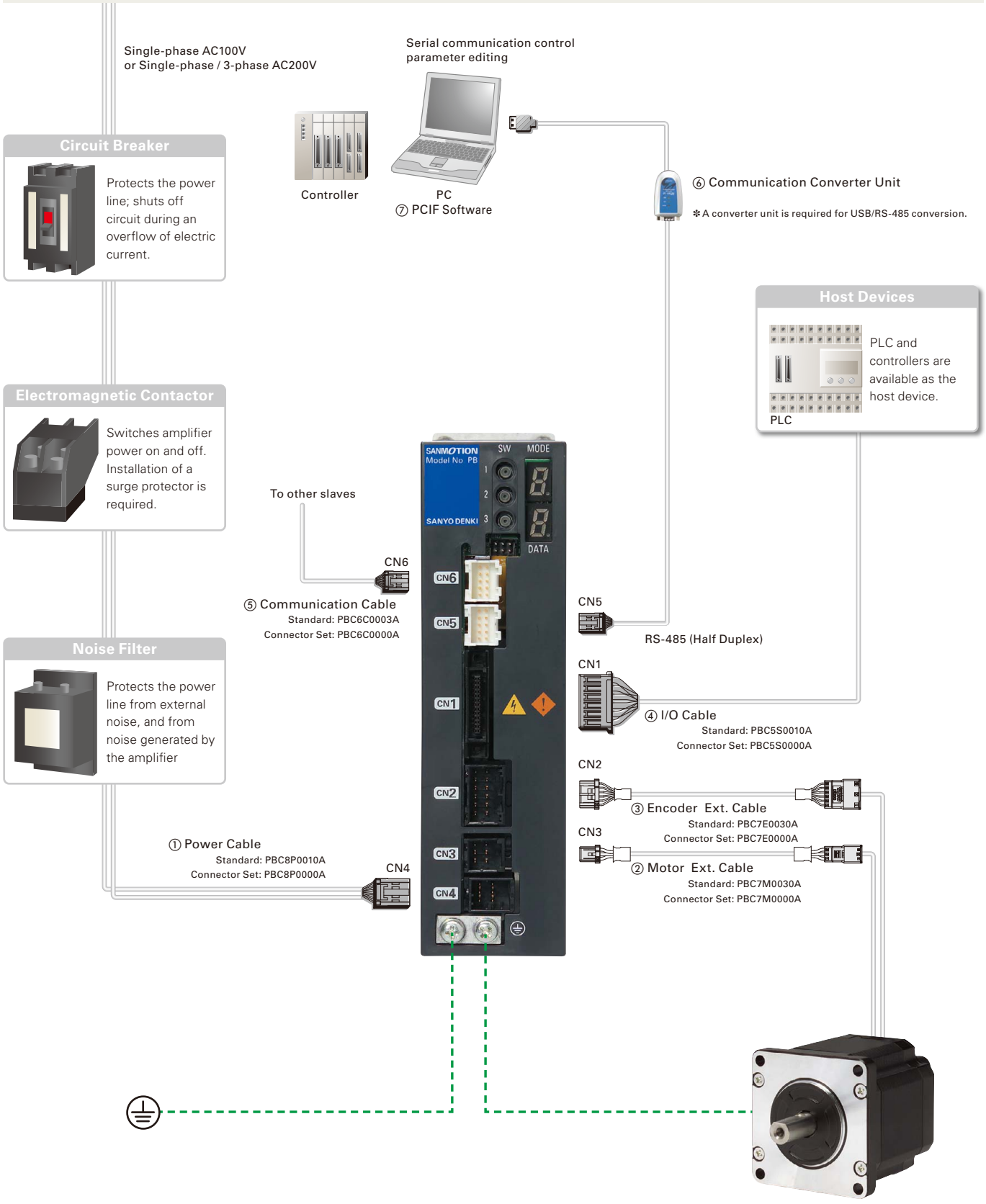
DC Power Source Multi Input Type (Universal Input + Pulse Train Input) (Type M)

Model	Motor Flange Size	Reduction Gear Ratio	Set Model No.	Set Accessories		
				Amplifier Model No.	Motor Model No.	Power Cable・I/O Cable
Standard Model	□28mm	–	**PBDM282**	PB3D003M200	PBM282FXE20	Power Cable (1m): PBC6P0010A I/O Cable (1m): PBC5S0010C
			PBDM284	PB3D003M200	PBM284FXE20	
	□42mm	–	**PBDM423**	PB3D003M200	PBM423FXE20	
	□60mm	–	**PBDM603**	PB3D003M200	PBM603FXE20	
			PBDM604	PB3D003M200	PBM604FXE20	
Low-backlash Gear Model	□42mm	1/3.6	**PBDM423-C3.6**	PB3D003M200	PBM423FGAE20	
		1/7.2	**PBDM423-C7.2**	PB3D003M200	PBM423FGBE20	
		1/10	**PBDM423-C10**	PB3D003M200	PBM423FGEE20	
		1/20	**PBDM423-C20**	PB3D003M200	PBM423FGGE20	
		1/30	**PBDM423-C30**	PB3D003M200	PBM423FGJE20	
	□60mm	1/3.6	**PBDM603-C3.6**	PB3D003M200	PBM603FGAE20	
		1/7.2	**PBDM603-C7.2**	PB3D003M200	PBM603FGBE20	
		1/10	**PBDM603-C10**	PB3D003M200	PBM603FGEE20	
		1/20	**PBDM603-C20**	PB3D003M200	PBM603FGGE20	
		1/30	**PBDM603-C30**	PB3D003M200	PBM603FGJE20	
Spur Gear Model	□28mm	1/3.6	**PBDM282-G3.6**	PB3D003M200	PBM282FGAE20	
		1/7.2	**PBDM282-G7.2**	PB3D003M200	PBM282FGBE20	
		1/10	**PBDM282-G10**	PB3D003M200	PBM282FGEE20	
		1/20	**PBDM282-G20**	PB3D003M200	PBM282FGGE20	
		1/30	**PBDM282-G30**	PB3D003M200	PBM282FGJE20	
		1/50	**PBDM282-G50**	PB3D003M200	PBM282FGLE20	
Harmonic Gear Model	□28mm	1/50	**PBDM282-H50**	PB3D003M200	PBM282FHLE20	
		1/100	**PBDM282-H100**	PB3D003M200	PBM282FHME20	
	□42mm	1/30	**PBDM423-H30**	PB3D003M200	PBM423FHJE20	
		1/50	**PBDM423-H50**	PB3D003M200	PBM423FHLE20	
		1/100	**PBDM423-H100**	PB3D003M200	PBM423FHME20	
	□60mm	1/50	**PBDM603-H50**	PB3D003M200	PBM603FHLE20	
		1/100	**PBDM603-H100**	PB3D003M200	PBM603FHME20	
Electromagnetic Brake Model	□28mm	–	**PBDM282-B**	PB3D003M200	PBM282FCE20	
			PBDM284-B	PB3D003M200	PBM284FCE20	
	□42mm	–	**PBDM423-B**	PB3D003M200	PBM423FCE20	
	□60mm	–	**PBDM603-B**	PB3D003M200	PBM603FCE20	
			PBDM604-B	PB3D003M200	PBM604FCE20	

Option Product Model Numbers (Not Included in Set Models)

Motor Ext. Cable	PBC6M0030A
Encoder Ext. Cable	PBC6E0030A
Communication Cable	PBC6C0003A
PC I/F Software	SPBA1W-01
USB / RS-485 Converter Unit	PBFM-U6

System Configuration

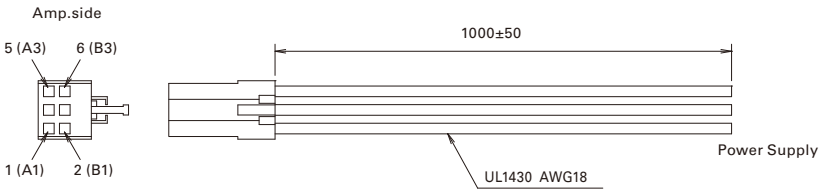


Options

Cable Type	Standard Model Number (Length)	Connector Set Model Number	Maximum Length	Remarks
① Power Cable	PBC8P0010A (1m)	PBC8P0000A	3m	–
② Motor Ext. Cable	PBC7M0030A (3m)	PBC7M0000A	20m	Use when an extension of 50cm or more is required.
③ Encoder Ext. Cable	PBC7E0030A (3m)	PBC7E0000A	20m	Use when an extension of 50cm or more is required.
④ I/O Cable (unshielded)	PBC5S0010A (1m)	PBC5S0000A	2m	Please select depending on the noise environment.
④ I/O Cable (shielded)	PBC5S0010C (1m)	PBC5S0000A	2m	Please select depending on the noise environment.
⑤ Communication Cable (to Amp.)	PBC6C0003A (30cm)	PBC6C0000A	100m	Use when multiple axes are connected in a daisy-chain configuration for communication.
⑥ Communication Converter Unit	PBFM-U6	–		USB/RS-485 Converter Unit Converter unit and cable set model
⑦ PC I/F Software	SPBALL-01	–	–	Software for operational check and parameter setting

Optional Cable

① Power Cable



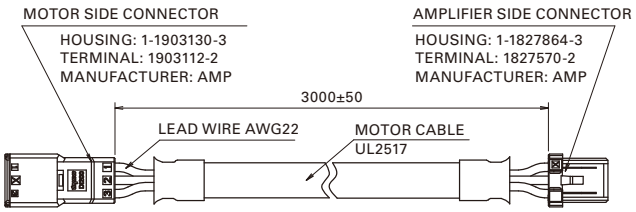
Connector Connection

PIN No.	LEAD COLR	Signal Name
A1	–	–
B1	Black	R
A2	–	–
B2	Black	S
A3	–	–
B3	Black	T

Connector Set:PBC8P0000A

Manufacturer	Type	Qty.
AMP	Housing: 1-1318119-3	1
	Contact: 1318107-1	6

② Motor Ext. Cable



Connector Set:PBC7M0000A

Manufacturer	Type	Qty.
AMP	Housing: 1-1903130-3	1
	Terminal: 1903112-2	6
	Housing: 1-1827864-3	1
	Terminal: 1827570-2	6

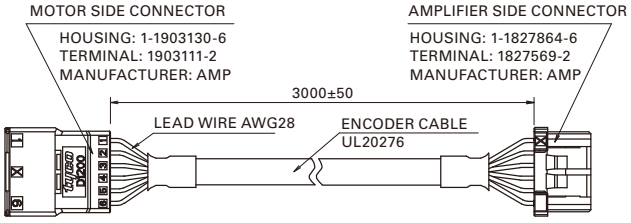
Connector Connection Of Motor Side

PIN No.	LEAD COLR	Signal Name
A1	Blue	Motor Lead Wire
B1	Orange	Motor Lead Wire
A2	Red	Motor Lead Wire
B2	Yellow	Motor Lead Wire
A3	White	Brake Lead Wire
B3	Black	Brake Lead Wire

Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	Signal Name
1(A1)	Blue	Motor Lead Wire
2(B1)	Orange	Motor Lead Wire
3(A2)	Red	Motor Lead Wire
4(B2)	Yellow	Motor Lead Wire
5(A3)	White	Brake Lead Wire
6(B3)	Black	Brake Lead Wire

③ Encoder Ext. Cable



Connector Connection Of Motor Side

PIN No.	LEAD COLR	Signal Name
A1	Blue	CHANNEL A
B1	Brown	CHANNEL $\overline{A}$
A2	Green	CHANNEL B
B2	Purple	CHANNEL $\overline{B}$
A3	White	CHANNEL C
B3	Yellow	CHANNEL $\overline{C}$
A4	Red	+5V
B4	Black	0V
A5	N.C.	–
B5	Orange	OVER HEAT
A6	Black	Shield
B6	N.C.	–

Connector Connection Of Amplifier Side

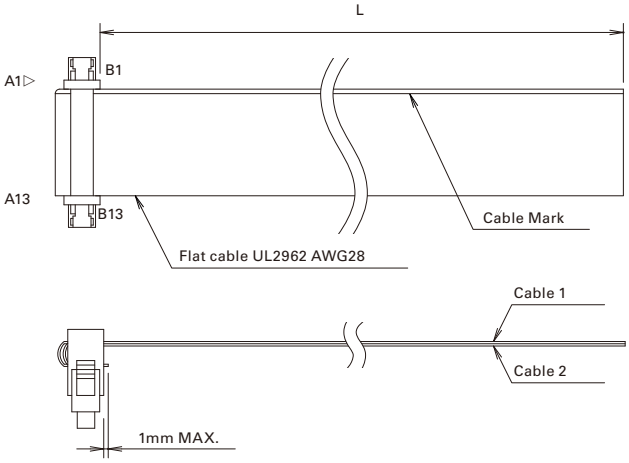
PIN No.	LEAD COLR	Signal Name
A1	Blue	CHANNEL A
B1	Brown	CHANNEL $\overline{A}$
A2	Green	CHANNEL B
B2	Purple	CHANNEL $\overline{B}$
A3	White	CHANNEL C
B3	Yellow	CHANNEL $\overline{C}$
A4	Red	+5V
B4	Black	0V
A5	N.C.	–
B5	Orange	OVER HEAT
A6	Black	Shield
B6	N.C.	–

Connector Set:PBC7E0000A

Manufacturer	Type	Qty.
AMP	Housing: 1-1903130-6	1
	Terminal: 1903112-2	10
	Housing: 1-1827864-6	1
	Terminal: 1827570-2	10

Optional Cable

④ I/O Cable (unshielded)



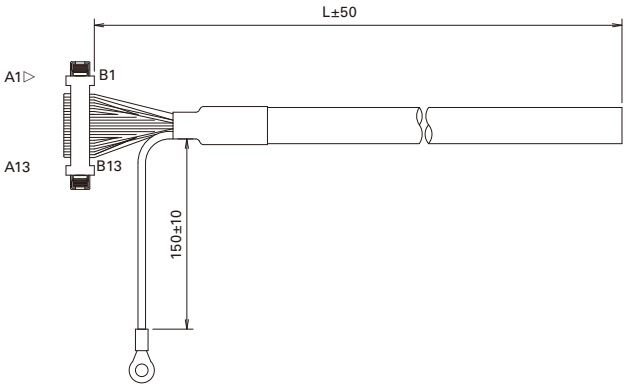
Cable Connection

Cable 1	Cable 2
A1-No.1	B1-No.14
A2-No.2	B2-No.15
A3-No.3	B3-No.16
A4-No.4	B4-No.17
A5-No.5	B5-No.18
A6-No.6	B6-No.19
A7-No.7	B7-No.20
A8-No.8	B8-No.21
A9-No.9	B9-No.22
A10-No.10	B10-No.23
A11-No.11	B11-No.24
A12-No.12	B12-No.25
A13-No.13	B13-No.26

Connector Set:PBC5S0000A

Manufacturer	Type	Qty.
KEL	Housing: 8822E-026-171D-F	1

④ I/O Cable (shielded)



CN Wiring

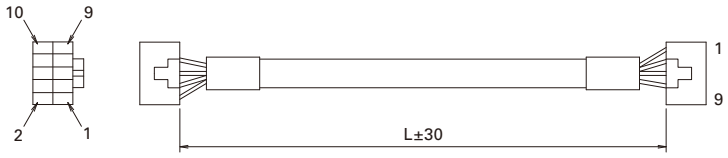
CN1 Pin.No.	Mark Display	Mark	LINE COLR
A1		Red	Orange
A2		Black	
A3		Red	Gray
A4		Black	
A5		Red	White
A6		Black	
A7		Red	Yellow
A8		Black	
A9		Red	Pink
A10		Black	
A11		Red	Orange
A12		Black	
A13		Red	Gray

CN1 Pin.No.	Mark Display	Mark	LINE COLR
B1		Black	Gray
B2		Red	White
B3		Black	
B4		Red	Yellow
B5		Black	
B6		Red	Pink
B7		Black	
B8		Red	Orange
B9		Black	
B10		Red	Gray
B11		Black	
B12		Red	White
B13		Black	

Connector Set:PBC5S0000A

Manufacturer	Type	Qty.
KEL	Housing: 8822E-026-171D-F	1

⑤ Communication Cable



Connector relay cable

Signal Name	CNA Pin.No.			CNB Pin.No.	Signal Name
A	1	Yellow	Yellow	1	A
B	2	White	White	2	B
(Y)	3	Brown	Brown	3	(Y)
(Z)	4	Blue	Blue	4	(Z)
GND	5	Black	Black	5	GND
Vcc	6			6	Vcc
PCA	7	Purple	Purple	7	PCA
PCB	8	Green	Green	8	PCB
24V	9			9	24V
GND	10	Drain	Drain	10	GND

Connector Set:PBC6C0000A

Manufacturer	Type	Qty.
JST	Housing: PADP-10V-1-S	1
	Contact: SPH-002T-P0.5L	10

Model No. PB Type R　Single-Axis Type

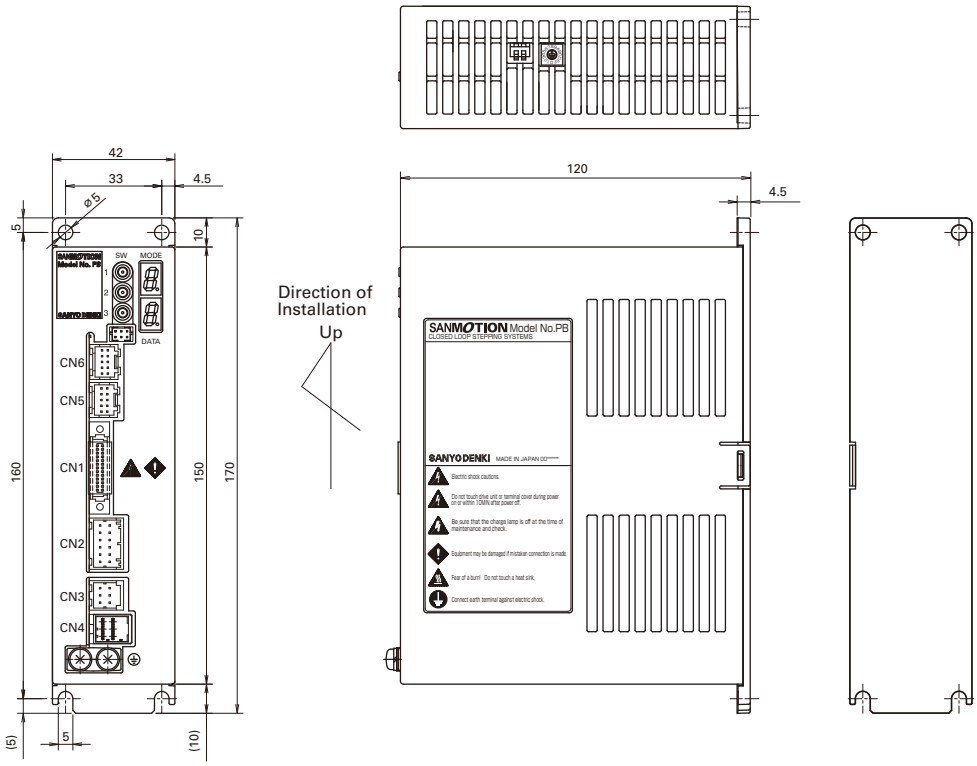
AC Power Input Type

General Specifications

Amplifier Model			PB4A002R300	PB4A002R301
Power Supply			Single phase AC100V to 115V　−15% +10%　50/60Hz	Single phase / 3-phase AC200V to 230V　−15% +10%　50/60Hz
Control Mode			PWM Control　SIN drive method	
Environment	Ambient temp.	Operating	0 to 55°C	
		Storage	−20 to 65°C	
	Operating/ Storage Humidity		90%RH (non-condensing)	
	Vibration Resistance		0.5G (tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2H)	
Structure			Tray structure　Rear mounting type	
Mass			Approx. 0.65kg	
Dimensions			W42×H150×D120	
Functions	Rotation Speed		0 to 4500min^{-1} (□86mm: 0 to 4000min^{-1})	
	Resolution (P/R)		Electronic gear 100 to 16000	
	Regeneration Process		Internal (Software processing)	
	Holding brake control function		Internal	
	Protective Functions		Power Voltage Error, Regeneration Voltage Error, Over-speed, Encoder Disconnection, CPU Error, Overload stop, Servo Error, Zero-return Error, Nonvolatile Memory Error, Initialization Error, Over-current, Amplifier Overheat, Motor Overheat, Counter Overflow	
	Display		7SEG LED Display (2 pieces)	
	Digital operator		Resolution, Related motor, Positive direction definition, Gain, Node Adress, Trans. Speed, Holding brake control, Jog driving	
	Operation Functions		Auto Zero-return / Push Operation (Current limit)	
	Communication specifications (PCIF)		RS-485 Start-Stop Synchronization, Half Duplex Communication, Trans. Speed: 9600, 38400, 115200, 307200bps	
Input/ Output Signals	Input Signals	Functions	ALMCLR General-purpose input ×8 (Point, STOP, EXE, SELECT, HOME sensor, Limit, Deviation CLR, Pause, Jog, Inter lock)	
		Electric	General-purpose input: Interactive input photo coupler　DC5V to 24V	
	Output Signals	Functions	ALMCLR General-purpose output×7 (Point No, Ack, Busy, HOME END, Push END, ZONE, Input Monitor, In-Position, Bit Out)	
		Electric	General-purpose output: Open collector, DC30V/15mA max	

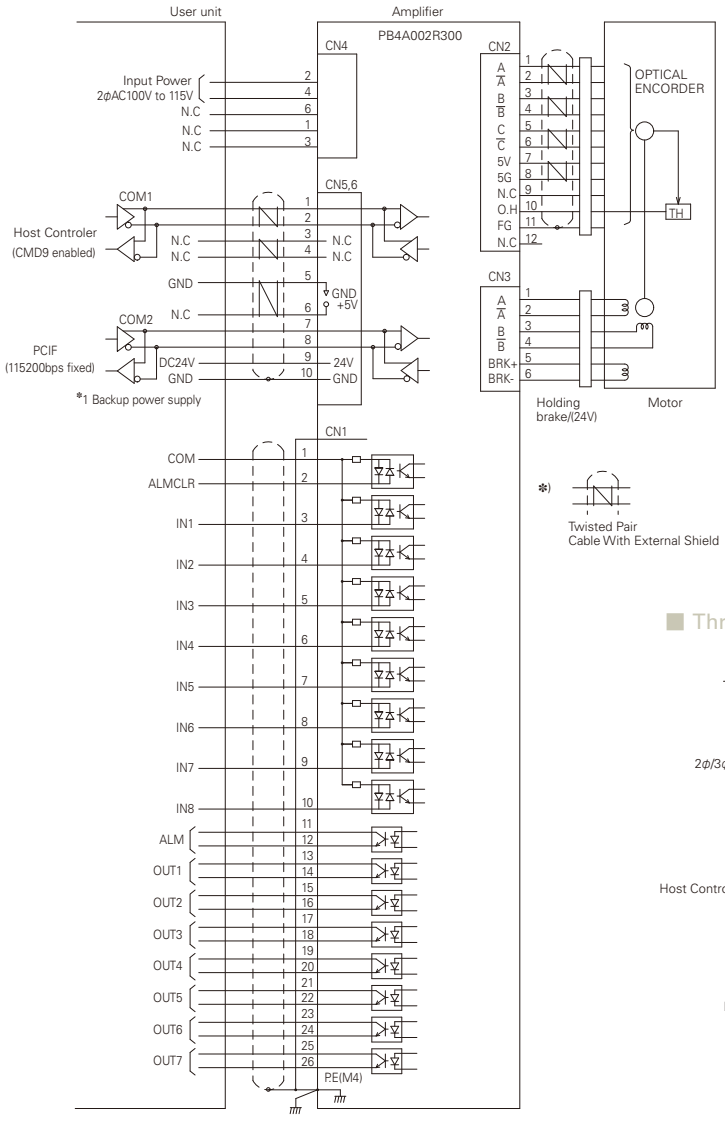
Amplifier Dimensional Drawing

(Unit:mm)

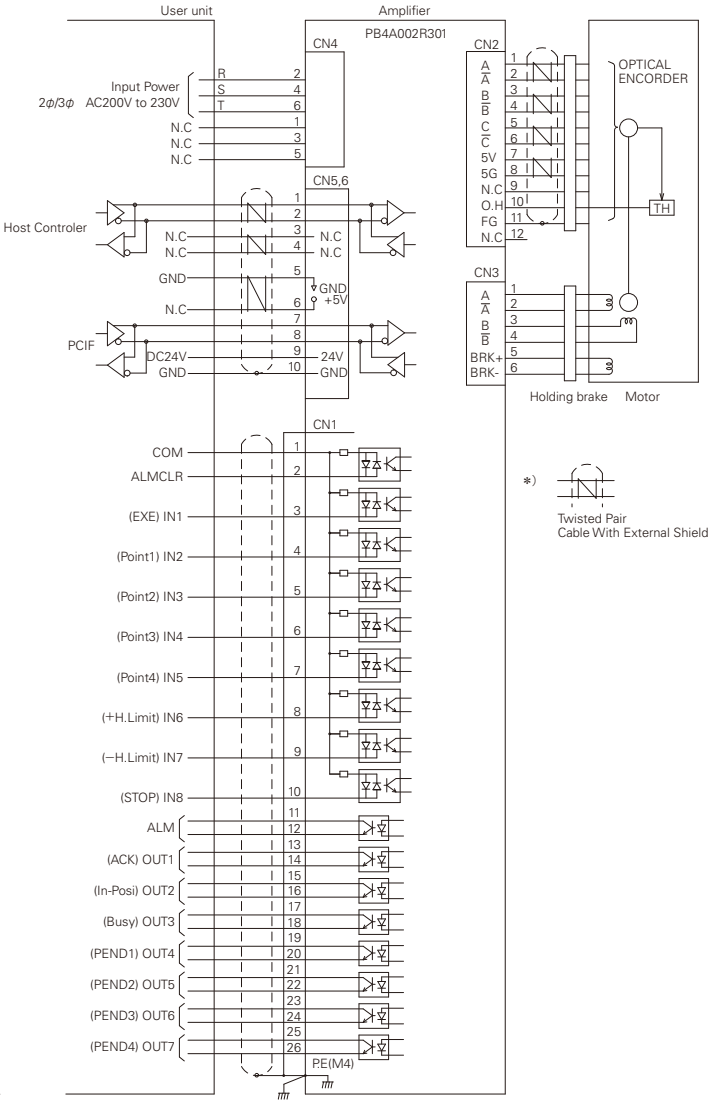


External Wiring Diagram

■ Single-phase AC100V to 115V　Amplifier Model No.: PB4A002R300

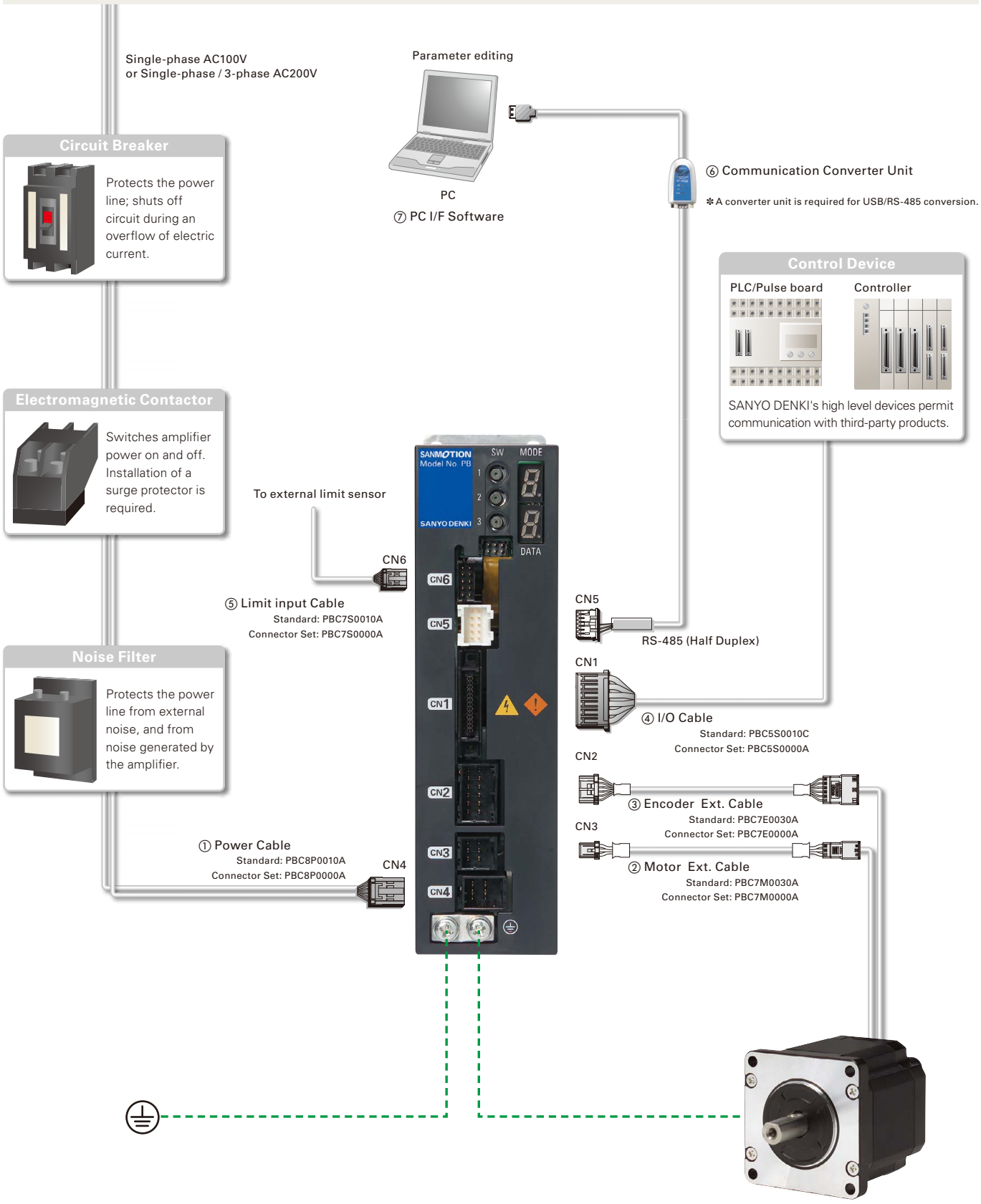


■ Three-phase AC 200 to 230V　Amplifier Model No.: PB4A002R301



✻ In the case of AC200V input.
✻ The I/O signal name in ( ) shows an initial value.

System Configuration

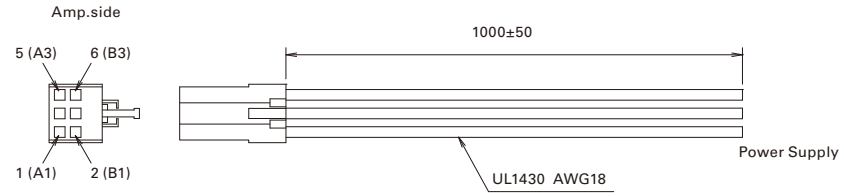


Options

Cable Type	Standard Model Number (Length)	Connector Set Model Number	Maximum Length	Remarks
① Power Cable	PBC8P0010A (1m)	PBC8P0000A	3m	–
② Motor Ext. Cable	PBC7M0030A (3m)	PBC7M0000A	20m	Use when an extension of 50cm or more is required.
③ Encoder Ext. Cable	PBC7E0030A (3m)	PBC7E0000A	20m	Use when an extension of 50cm or more is required.
④ I/O Cable (shielded)	PBC5S0010C (1m)	PBC5S0000A	2m	–
⑤ Limit Input Cable	PBC7S0010A (1m)	PBC7S0000A	2m	External limit sensor input
⑥ Communication Converter Unit	PBFM-U6	–		USB/RS-485 Converter Unit Converter unit and cable set model
⑦ PC I/F Software	SPBALL-01	–	–	Software for operational check and parameter setting

Optional Cable

① Power Cable



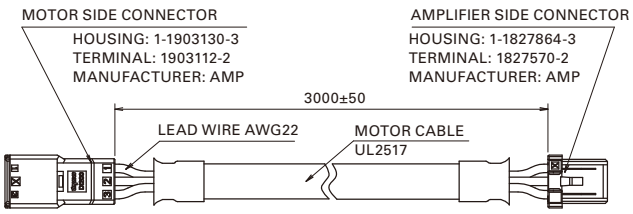
Connector Connection

PIN No.	LEAD COLR	Signal Name
A1	–	–
B1	Black	R
A2	–	–
B2	Black	S
A3	–	–
B3	Black	T

Connector Set:PBC8P0000A

Manufacturer	Type	Qty.
AMP	Housing: 1-1318119-3	1
	Contact: 1318107-1	6

② Motor Ext. Cable



Connector Set:PBC7M0000A

Manufacturer	Type	Qty.
AMP	Housing: 1-1903130-3	1
	Terminal: 1903112-2	6
	Housing: 1-1827864-3	1
	Terminal: 1827570-2	6

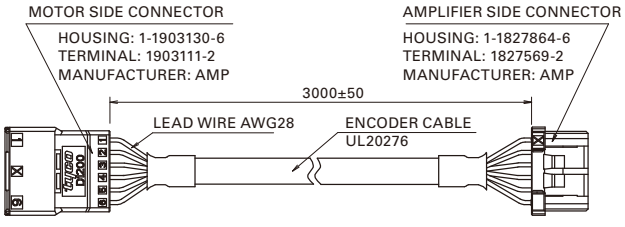
Connector Connection Of Motor Side

PIN No.	LEAD COLR	Signal Name
A1	Blue	Motor Lead Wire
B1	Orange	Motor Lead Wire
A2	Red	Motor Lead Wire
B2	Yellow	Motor Lead Wire
A3	White	Brake Lead Wire
B3	Black	Brake Lead Wire

Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	Signal Name
1(A1)	Blue	Motor Lead Wire
2(B1)	Orange	Motor Lead Wire
3(A2)	Red	Motor Lead Wire
4(B2)	Yellow	Motor Lead Wire
5(A3)	White	Brake Lead Wire
6(B3)	Black	Brake Lead Wire

③ Encoder Ext. Cable



Connector Connection Of Motor Side

PIN No.	LEAD COLR	Signal Name
A1	Blue	CHANNEL A
B1	Brown	CHANNEL $\overline{A}$
A2	Green	CHANNEL B
B2	Purple	CHANNEL $\overline{B}$
A3	White	CHANNEL C
B3	Yellow	CHANNEL $\overline{C}$
A4	Red	+5V
B4	Black	0V
A5	N.C.	–
B5	Orange	OVER HEAT
A6	Black	Shield
B6	N.C.	–

Connector Connection Of Amplifier Side

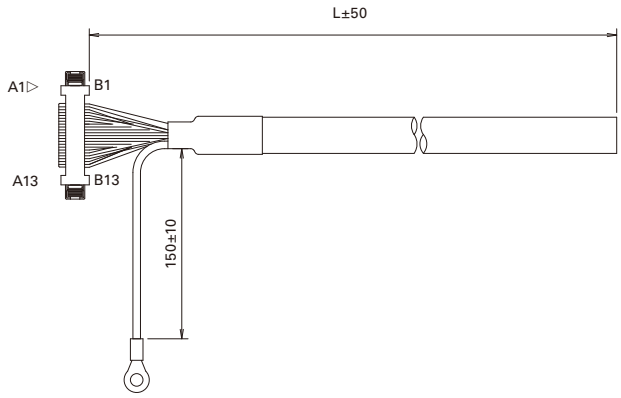
PIN No.	LEAD COLR	Signal Name
A1	Blue	CHANNEL A
B1	Brown	CHANNEL $\overline{A}$
A2	Green	CHANNEL B
B2	Purple	CHANNEL $\overline{B}$
A3	White	CHANNEL C
B3	Yellow	CHANNEL $\overline{C}$
A4	Red	+5V
B4	Black	0V
A5	N.C.	–
B5	Orange	OVER HEAT
A6	Black	Shield
B6	N.C.	–

Connector Set:PBC7E0000A

Manufacturer	Type	Qty.
AMP	Housing: 1-1827864-6	1
	Terminal: 1903112-2	10
	Housing: 1-1903130-6	1
	Terminal: 1827570-2	10

Optional Cable

④ I/O Cable (shielded)



CN Wiring

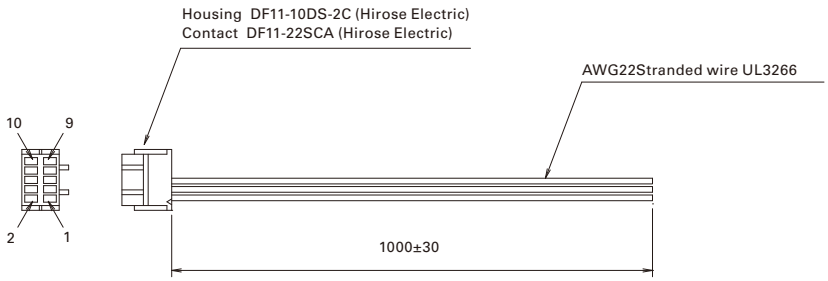
CN1 Pin.No.	Mark Display	Mark	LINE COLR
A1		Red	Orange
A2		Black	
A3		Red	Gray
A4		Black	
A5		Red	White
A6		Black	
A7		Red	Yellow
A8		Black	
A9		Red	Pink
A10		Black	
A11		Red	Orange
A12		Black	
A13		Red	Gray

CN1 Pin.No.	Mark Display	Mark	LINE COLR
B1		Black	Gray
B2		Red	White
B3		Black	
B4		Red	Yellow
B5		Black	
B6		Red	Pink
B7		Black	
B8		Red	Orange
B9		Black	
B10		Red	Gray
B11		Black	
B12		Red	White
B13		Black	

Connector Set:PBC5S0000A

Manufacturer	Type	Qty.
KEL	Housing: 8822E-026-171D-F	1

⑤ Limit Input Cable



Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	Signal Name
1	Red	–
2	Blue	–
3	Black	Positive Limit +
4	Black	Positive Limit +
5	Black	Negative Limit –
6	Black	Negative Limit –
7	N.C.	–
8	N.C.	–
9	N.C.	–
10	N.C.	–

Connector Set: PBC7S0000A

Manufacturer	Type	Qty.
Hirose	Housing: DF11-10DS-2C	1
Electric	Contact: DF11-2428SCA	10

Model No. PB Type P

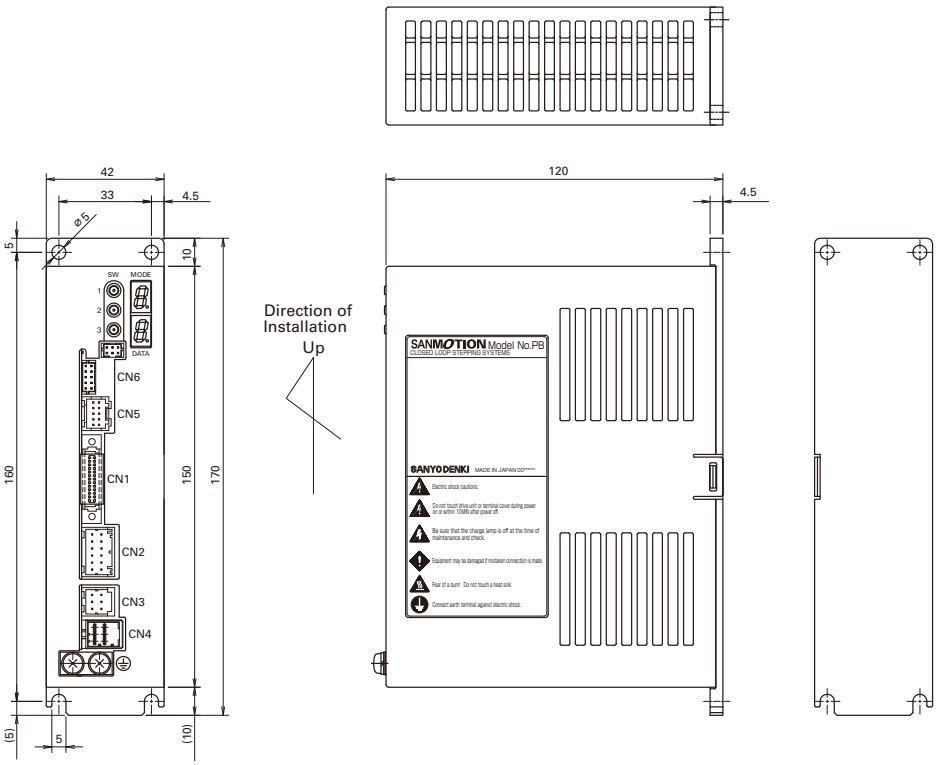
AC Power Input Type

General Specifications

Amplifier Model			PB4A002P300	PB4A002P301
Power Supply			Single phase AC100V to 115V −15% +10% 50/60Hz	Single phase / 3-phase AC200V to 230V −15% +10% 50/60Hz
Control Mode			PWM Control SIN drive method	
Environment	Ambient temp.	Operating	0 to 55°C	
		Storage	−20 to 65°C	
	Operating/Storage Humidity		90%RH (non-condensing)	
	Vibration Resistance		0.5G (tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2H)	
Structure			Tray structure Rear mounting type	
Mass			Approx. 0.65kg	
Dimensions			W42×H150×D120	
Functions	Rotation Speed		0 to 4500min^{-1} (□86mm: 0 to 4000min^{-1})	
	Resolution (P/R)		Electronic gear 100 to 16000	
	Regeneration Process		Internal (Software processing)	
	Holding brake control function		Internal	
	Protective Functions		Power Voltage Error, Regeneration Voltage Error, Over-speed, Encoder Disconnection, Instruction Pulse Error, CPU Error, Overload stop, Servo Error, Zero-return Error, Nonvolatile Memory Error, Initialization Error, Over-current, Amplifier Overheat, Motor Overheat, Counter Overflow	
	Display		7SEG LED Display (2 pieces)	
	Digital operator		Resolution, Pulse input method, Related motor, Positive direction definition, Gain, FF gain, S-Shape filter, Jog driving	
	Operation Functions		Auto Zero-return / Push Operation (Current limit) / S-Shape Operation function	
	Communication specifications (PCIF)		RS-485 Start-Stop Synchronization, Half Duplex Communication, Trans. Speed: 115200bps	
Input/ Output Signals	Input Signals	Functions	Pulse Input, STOP, ALMCLR General-purpose input×2 (Deviation CLR, HOME, Push, Brake control, Counter reset)	
		Electric	Pulse Input: Line receiver (1or2 input mode) General-purpose input: Interactive input photo coupler DC5V to 24V	
	Output Signals	Functions	Encoder Signal (A / B / C) ALM, In-Position General-purpose output×2 (HOME END, Push END, ZONE, Input Monitor)	
		Electric	Encoder Signal Output: Line Amplifier 4000P/R *C-phase / phase origin signal outputs will not be emitted at velocities over 200min^{-1}. General-purpose output: Open collector DC30V / 15mA max	

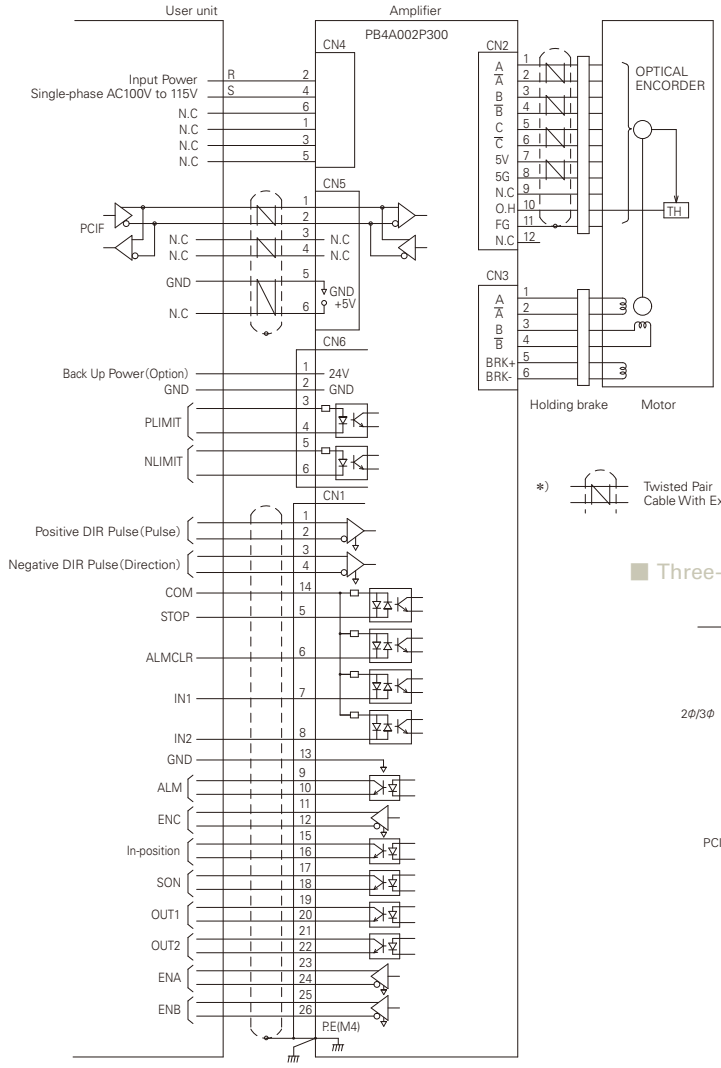
Amplifier Dimensional Drawing

(Unit:mm)

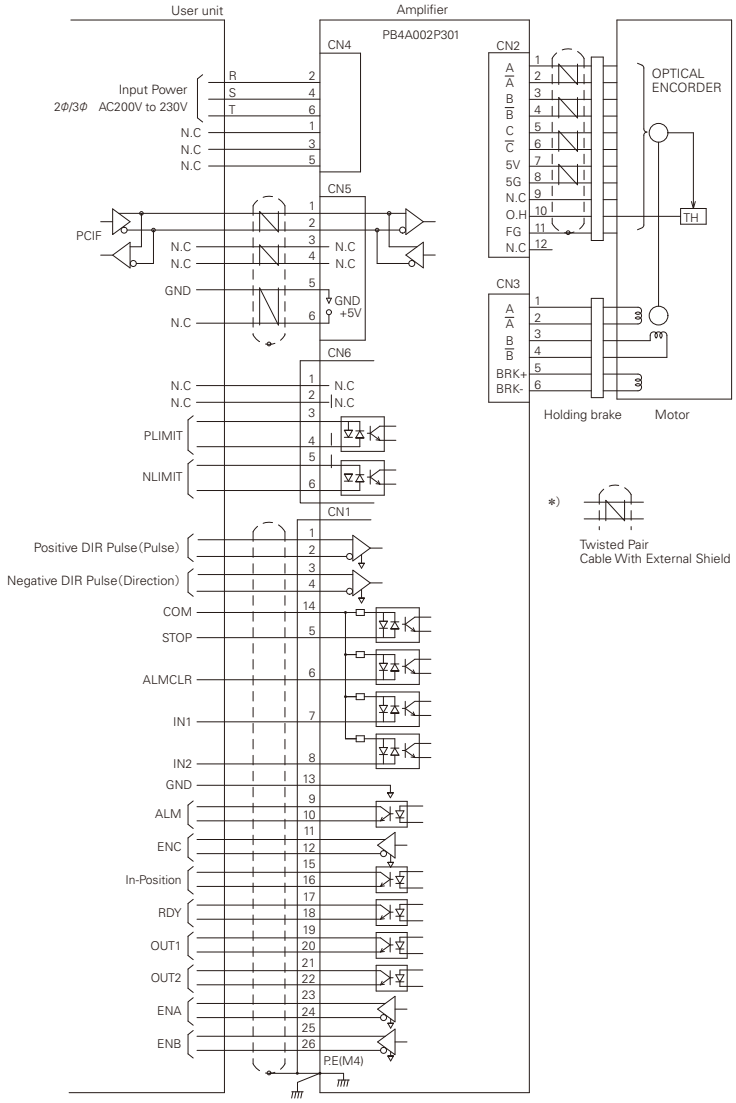


External Wiring Diagram

■ Single-phase AC100V to 115V　Amplifier Model No.: PB4A002P300



■ Three-phase AC 200 to 230V　Amplifier Model No.: PB4A002P301

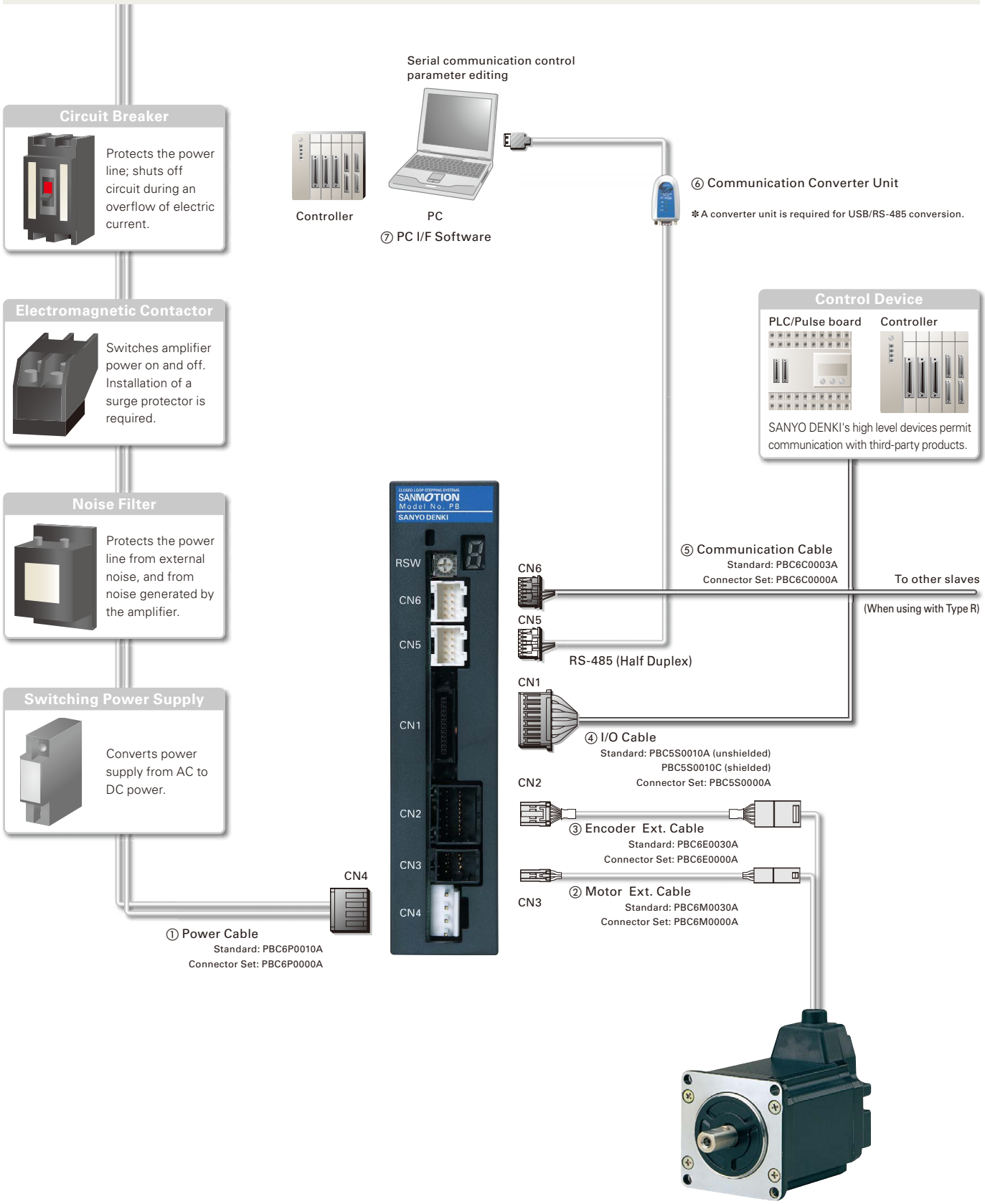


✻ IN1, IN2, OUT1, and OUT2 functions are selected by PC I/F software.

Model No. PB Type M

DC Power Input Type

System Configuration

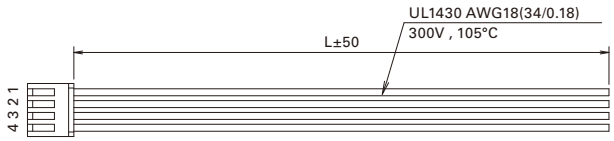


Options

Cable Type	Standard Model Number (Length)	Connector Set Model Number	Maximum Length	Remarks
① Power Cable	PBC6P0010A (1m)	PBC6P0000A	3m	–
② Motor Ext. Cable	PBC6M0030A (3m)	PBC6M0000A	20m	Use when an extension of 50cm or more is required.
③ Encoder Ext. Cable	PBC6E0030A (3m)	PBC6E0000A	20m	Use when an extension of 50cm or more is required.
④ I/O Cable (unshielded)	PBC5S0010A (1m)	PBC5S0000A	2m	Please select depending on the noise environment.
④ I/O Cable (shielded)	PBC5S0010C (1m)	PBC5S0000A	2m	Use for pulse input
⑤ Communication Cable (to Amp.)	PBC6C0003A (30cm)	PBC6C0000A	100m	Use when multiple axes are connected in a daisy-chain configuration for communication. Not required when using pulse stream input.
⑥ Communication Converter Unit	PBFM-U6	–		USB/RS-485 Converter Unit Converter unit and cable set model
⑦ PC I/F Software	SPBA1W-01	–	–	Software for operational check and parameter setting

Optional Cable

① Power Cable



Connector Connection Of Amplifier Side

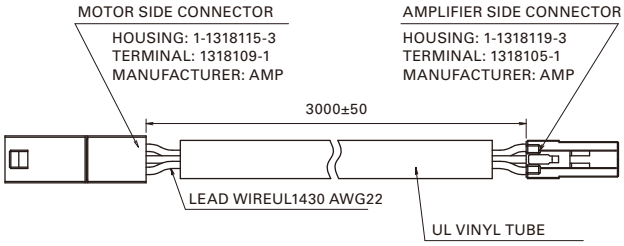
PIN No.	LEAD COLR	Signal Name
1	Red	DC+24/48V
2	Blue	GND
3	Yellow	(DC24V)*1
4	Green	FG

*1 Connect control circuit to power source only for models with part numbers ending with" 1".

Connector Set:PBC6P0000A

Manufacturer	Type	Qty.
JST	Housing: VHR-4N	1
	Contact: SVH-41T-P1.1	4

② Motor Ext. Cable



Connector Set:PBC6M0000A

Manufacturer	Type	Qty.
AMP	Housing: 1-1318115-3	1
	Terminal: 1318109-1	6
	Housing: 1-1318119-3	1
	Terminal: 1318105-1	6

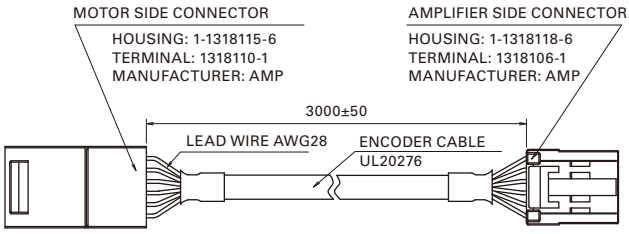
Connector Connection Of Motor Side

PIN No.	LEAD COLR	Signal Name
A1	Blue	Motor Lead Wire
B1	Orange	Motor Lead Wire
A2	Red	Motor Lead Wire
B2	Yellow	Motor Lead Wire
A3	White	Brake Lead Wire
B3	Black	Brake Lead Wire

Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	Signal Name
1(A1)	Blue	Motor Lead Wire
2(B1)	Orange	Motor Lead Wire
3(A2)	Red	Motor Lead Wire
4(B2)	Yellow	Motor Lead Wire
5(A3)	White	Brake Lead Wire
6(B3)	Black	Brake Lead Wire

③ Encoder Ext. Cable



Connector Connection Of Motor Side

PIN No.	LEAD COLR	Signal Name
A1	Blue	CHANNEL A
B1	Brown	CHANNEL $\overline{A}$
A2	Green	CHANNEL B
B2	Purple	CHANNEL $\overline{B}$
A3	White	CHANNEL C
B3	Yellow	CHANNEL $\overline{C}$
A4	Red	+5V
B4	Black	0V
A5	N.C.	—
B5	Orange	OVER HEAT
A6	Black	Shield
B6	N.C.	—

Connector Connection Of Amplifier Side

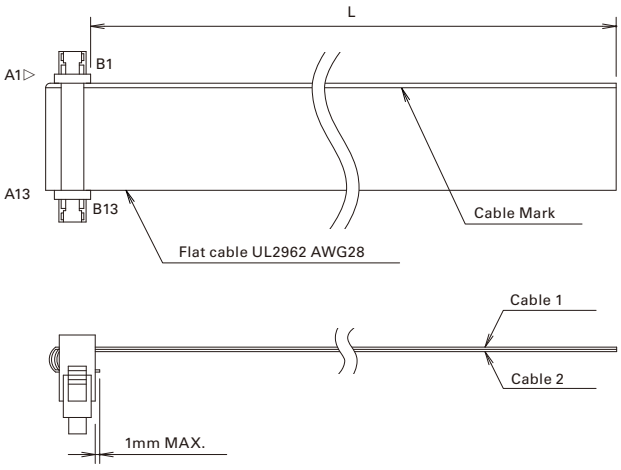
PIN No.	LEAD COLR	Signal Name
1(A1)	Blue	CHANNEL A
2(B1)	Brown	CHANNEL $\overline{A}$
3(A2)	Green	CHANNEL B
4(B2)	Purple	CHANNEL $\overline{B}$
5(A3)	White	CHANNEL C
6(B3)	Yellow	CHANNEL $\overline{C}$
7(A4)	Red	+5V
8(B4)	Black	0V
9(A5)	N.C.	—
10(B5)	Orange	OVER HEAT
11(A6)	Black	Shield
12(B6)	N.C.	—

Connector Set:PBC6E0000A

Manufacturer	Type	Qty.
AMP	Housing: 1-1318115-6	1
	Terminal: 1318110-1	10
	Housing: 1-1318118-6	1
	Terminal: 1318106-1	10

Optional Cable

④ I/O Cable (unshielded)



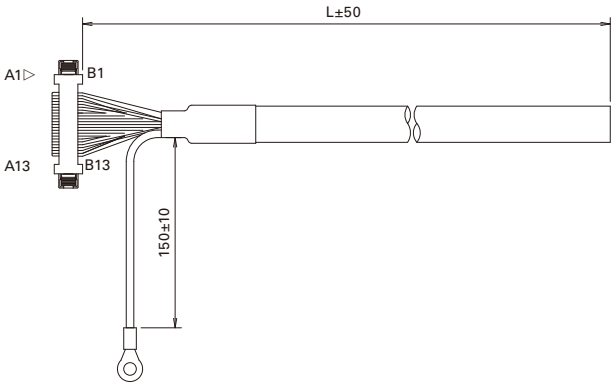
Cable Connection

Cable 1	Cable 2
A1-No.1	B1-No.14
A2-No.2	B2-No.15
A3-No.3	B3-No.16
A4-No.4	B4-No.17
A5-No.5	B5-No.18
A6-No.6	B6-No.19
A7-No.7	B7-No.20
A8-No.8	B8-No.21
A9-No.9	B9-No.22
A10-No.10	B10-No.23
A11-No.11	B11-No.24
A12-No.12	B12-No.25
A13-No.13	B13-No.26

Connector Set:PBC5S0000A

Manufacturer	Type	Qty.
KEL	Housing: 8822E-026-171D-F	1

④ I/O Cable (shielded)



CN Wiring

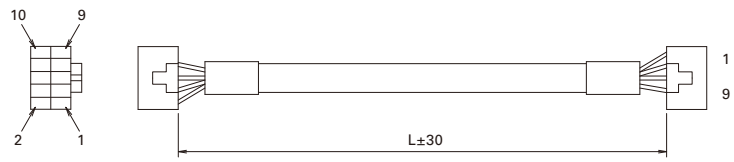
CN1 Pin.No.	Mark Display	Mark	LINE COLR
A1		Red	Orange
A2		Black	
A3		Red	Gray
A4		Black	
A5		Red	White
A6		Black	
A7		Red	Yellow
A8		Black	
A9		Red	Pink
A10		Black	
A11		Red	Orange
A12		Black	
A13		Red	Gray

CN1 Pin.No.	Mark Display	Mark	LINE COLR
B1		Black	Gray
B2		Red	White
B3		Black	
B4		Red	Yellow
B5		Black	
B6		Red	Pink
B7		Black	
B8		Red	Orange
B9		Black	
B10		Red	Gray
B11		Black	
B12		Red	White
B13		Black	

Connector Set:PBC5S0000A

Manufacturer	Type	Qty.
KEL	Housing: 8822E-026-171D-F	1

⑤ Communication Cable



Connector relay cable

Signal Name	CNA Pin.No.		CNB Pin.No.	Signal Name
A	1	Yellow	1	A
B	2	White	2	B
(Y)	3	Brown	3	(Y)
(Z)	4	Blue	4	(Z)
GND	5	Black	5	GND
Vcc	6	Red	6	Vcc
—	7	Purple	7	—
—	8	Green	8	—
—	9		9	—
FG	10	Drain	10	FG

Connector Set:PBC6C0000A

Manufacturer	Type	Qty.
JST	Housing: PADP-10V-1-S	1
	Contact: SPH-002T-P0.5L	10

Model No. PB Type M

DC Power Input Type

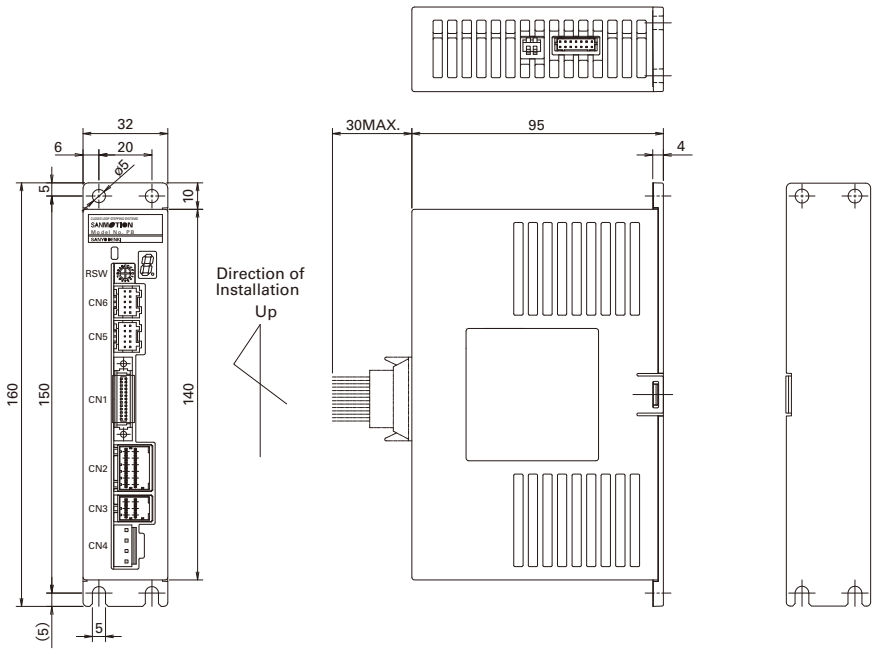
General Specifications

Amplifier Model			PB3D003M200, PB3D003M201	
Interface			Generic Input (SW1=ON)	Pulse Train Input (SW1 = OFF)
Control Mode			PWM Control SIN drive method	
Power Supply	Single Power		DC24V/48V ±10% (□28mm Motor is only available as 24V.) Note 1	
Environment	Ambient temp.	Operating	0 to 55°C	
		Storage	−20 to 70°C	
	Operating/ Storage Humidity		90% RH (non-condensing)	
	Vibration Resistance		0.5G (tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2H)	
Mass/Dimensions			Approx. 0.36Kg/W32×H160×D95	
Functions	Rotation Speed		0 to 4500min^{-1}	
	Resolution (P/R)		500, 1000, 2000, 4000, 5000, 10000	
	Regeneration Process		Internal	
	Protective Functions		Power Voltage Error, Regeneration Voltage Error, Over-speed, Encoder Disconnection, CPU Error, Overload Stop, Excessive Position Deviation, Zero-return Error, Nonvolatile Memory Error, Initialization Error (Power Line Disconnection)	
	Display		7SEG LED Display	
	Functions		Normal Drive (incremental move , absolute move), Zero-return, Module Operation, Push Operation, Teaching Functions Point Functions: 128Point Program Functions: 1PRG×1024Line 32PRG×32Line 128PRG×8Line	Normal Drive, Zero-return
	Rotary Switch		Node Adress Setting (0 to F)	Normalize velocity loop gain setting
	DIP-Switches		SSW1: Interface Selection (On: RS-485, OFF: Pulse) SW2: Terminating Resistor Setting (On: with terminating resistance)	
Input/ Output Signals	Input Signals		(Normal Mode) STOP, EXE, POINT, HOME, JOG, SELECT, Pause, Interlock, Generic Input, MODE SELECT, Hard Limit, ALM CLR (Teaching Mode) STOP, JOG, Point, PWR Pulse input: Photo coupler: DC3V to 5V (Input resistance=270Ω) Input signal: DC5V to 24V	Pulse, STOP, ALMCLR, Gain Setting, Deviation Clear, HOME
	Output Signals		(Normal Mode) Ack, PEND, END, Busy, Zone, Mode MON, STOP MON, In-Position, Homing complete, Generic Output, Encoder Output, SON MON, ALM, HEND, Input Monitor (Teaching Mode) PEND, HEND, In-Position, Mode MON, SON MON Output signal: Open collector DC30V / 30mA max *Encoder C-phase signal outputs within 200 min^{-1}	ALM, STOP MON, In-Position, Homing complete, Encoder Output, SON MON, STOP MON
	Communication Specifications Trans. Speed		RS-485 Standard Start-Stop Synchronization, Half Duplex	
			9600, 38400, 115200, 128000bps	9600bps

Note 1 : Operation of the holding brake is not available when the single input voltage amplifier is used at 48V input voltage. If operation of the holding brake is required at 48V input voltage, please use amplifier model PB3D003M201 (separate voltage type) with control voltage (CN4-3pin/common GND with main circuit) set at 24V.

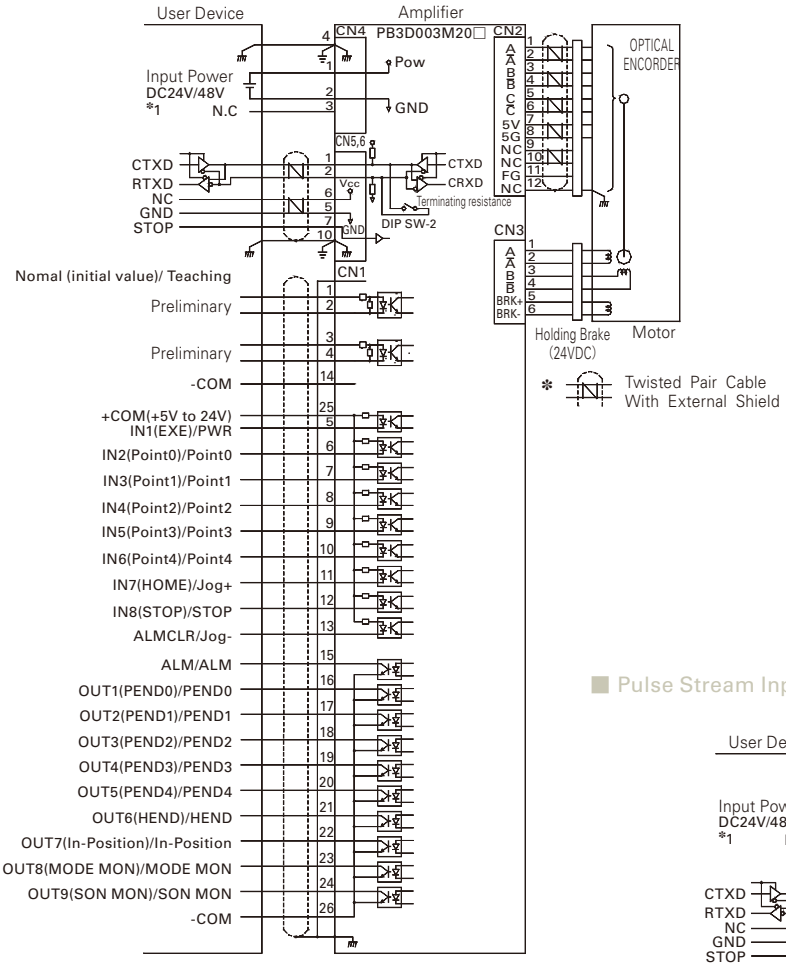
Amplifier Dimensional Drawing

(Unit:mm)

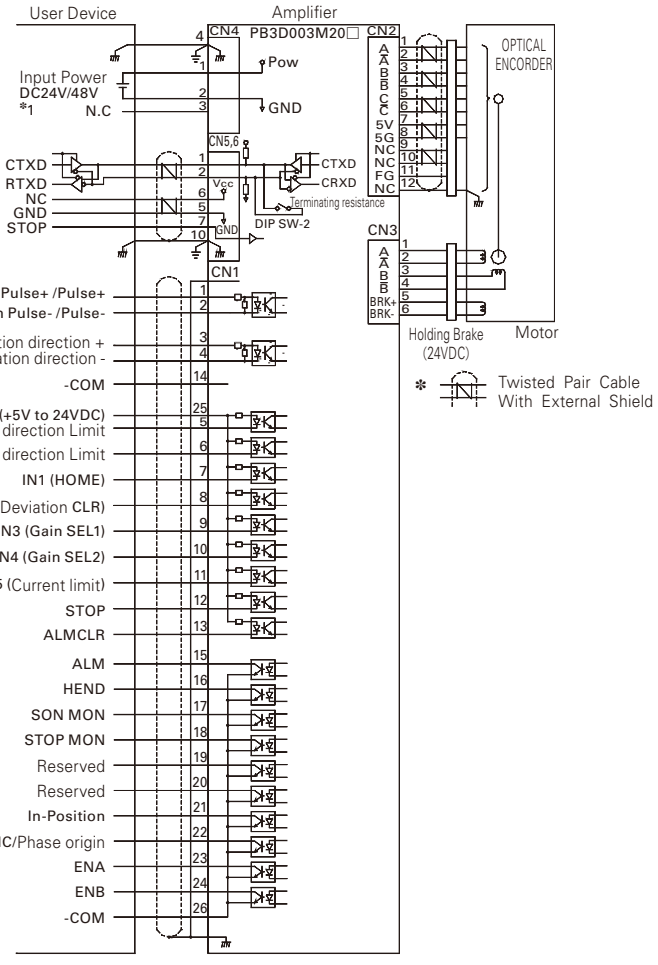


External Wiring Diagram

■ Generic Input DIP Switch SW1:ON



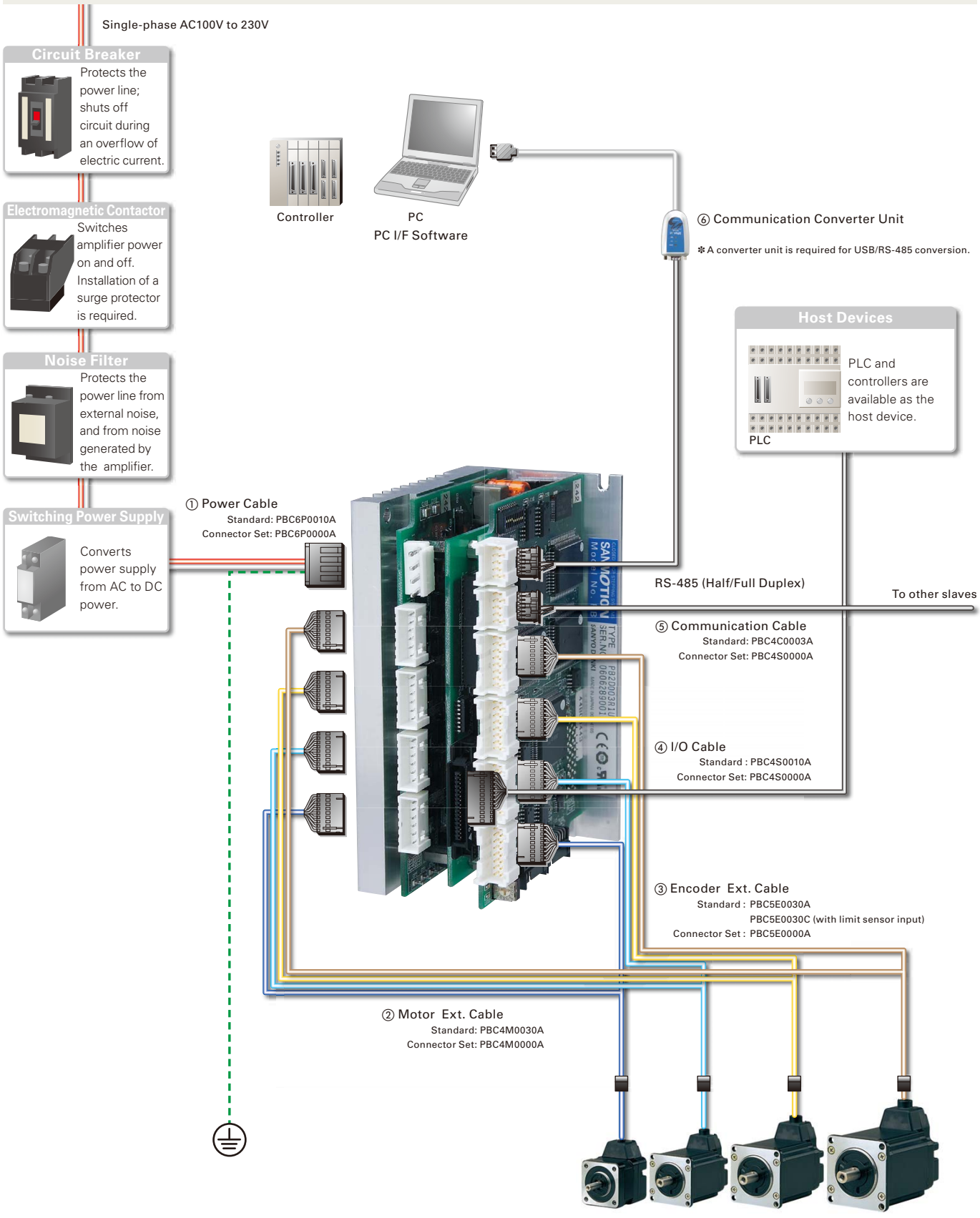
■ Pulse Stream Input DIP Switch SW1:OFF



Note : The CN1 general-purpose input / output signal function is selected through communication. Please see the basic specifications for details.
✻1 Connect control circuit to power source only for models with part numbers ending with" 1".

DC Power Input Type

System Configuration

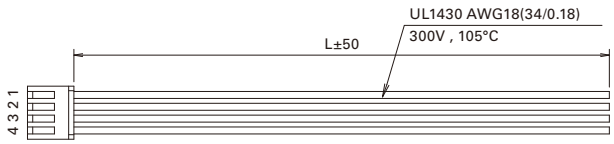


Options

Cable Type	Standard Model Number (Length)	Connector Set Model Number	Maximum Length	Remarks
① Power Cable	PBC6P0010A (1m)	PBC6P0000A	2m	—
② Motor Cable	PBC4M0030A (3m)	PBC4M0000A	20m	An extension cable is required.
③ Encoder Cable	PBC5E0030A (3m)	PBC5E0000A	20m	An extension cable is required.
③ Encoder Cable (with limit sensor input)	PBC5E0030C (3m)	PBC5E0000A	20m	Please specify when using an external limit sensor.
④ I/O Cable	PBC4S0010A (1m)	PBC4S0000A	2m	—
⑤ Communication Cable	PBC4C0003A (30cm)	PBC4C0000A	100m	Use when multiple axes are connected in a daisy-chain configuration for communication.
⑥ Communication Converter Unit	PBFM-U6	—		USB/RS-485 Half Duplex Converter Unit Converter unit and cable set model
⑦ PC I/F Software	SPBD2W-01	—	—	Software for operational check and parameter setting
⑧ Regenerative Unit	PBFE-01	—	—	Required if regeneration voltage is more than 40V

Optional Cable

① Power Cable



Connector Connection Of Amplifier Side

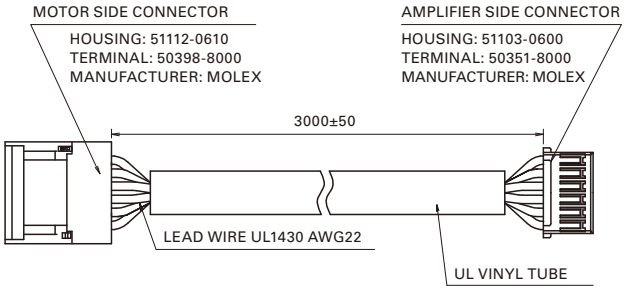
PIN No.	LEAD COLR	Signal Name
1	Red	DC+24/48V
2	Blue	GND
3	Yellow	DC+24V※1
4	Green	FG

※1 Connect only for amplifiers with part numbers ending with "1" or "2"

Connector Set:PBC6P0000A

Manufacturer	Type	Qty.
JST	Housing: VHR-4N	1
	Contact: SVH-41T-P1.1	4

② Motor Cable



Connector Set:PBC4M0000A

Manufacturer	Type	Qty.
MOLEX	Housing: 51112-0610	1
	Terminal: 50398-8000	6
	Housing: 51103-0600	1
	Terminal: 50351-8000	6

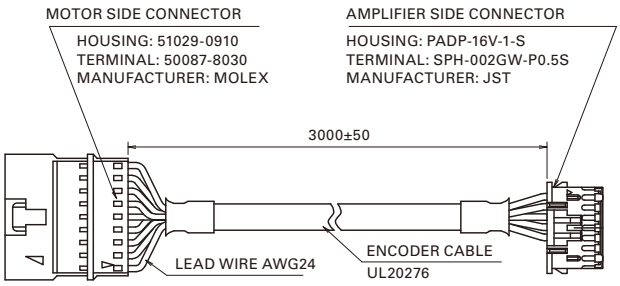
Connector Connection Of Motor Side

PIN No.	LEAD COLR	Signal Name
1	Blue	Motor Lead Wire
2	Orange	Motor Lead Wire
3	Red	Motor Lead Wire
4	Yellow	Motor Lead Wire
5	White	Brake Lead Wire
6	Black	Brake Lead Wire

Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	Signal Name
1	Blue	Motor Lead Wire
2	Orange	Motor Lead Wire
3	Red	Motor Lead Wire
4	Yellow	Motor Lead Wire
5	White	Brake Lead Wire
6	Black	Brake Lead Wire

③ Encoder Cable



Connector Connection Of Motor Side

PIN No.	LEAD COLR	Signal Name
1	Blue	CHANNEL A
2	Brown	CHANNEL $\overline{A}$
3	Green	CHANNEL B
4	Purple	CHANNEL $\overline{B}$
5	White	CHANNEL C
6	Yellow	CHANNEL $\overline{C}$
7	Red	+5V
8	Black	0V
9	Black	Shield

Connector Connection Of Amplifier Side

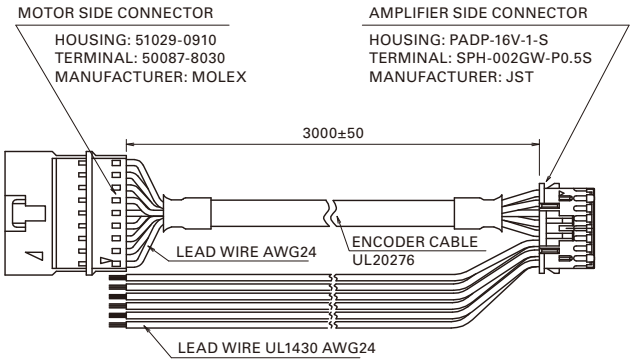
PIN No.	LEAD COLR	Signal Name
1	Blue	CHANNEL A
2	Brown	CHANNEL $\overline{A}$
3	Green	CHANNEL B
4	Purple	CHANNEL $\overline{B}$
5	White	CHANNEL C
6	Yellow	CHANNEL $\overline{C}$
7	Red	+5V
8	Black	0V
9	Black	Shield
10	N.C.	–
11	N.C.	–
12	N.C.	–
13	N.C.	–
14	N.C.	–
15	N.C.	–
16	N.C.	–

Connector Set:PBC5E0000A

Manufacturer	Type	Qty.
MOLEX	Housing: 51029-0910	1
	Terminal: 50087-8030	9
JST	Housing: PADP-16V-1-S	1
	Terminal: SPH-002GW-P0.5S	15

Optional Cable

③ Encoder Cable (with limit sensor input)



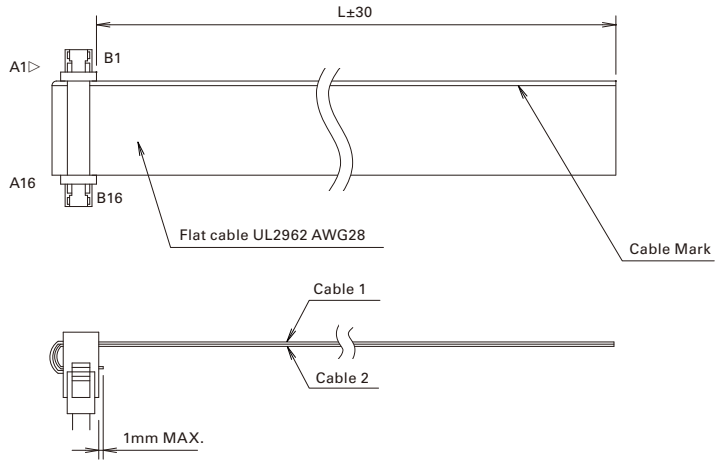
Connector Connection Of Motor Side

PIN No.	LEAD COLR	Signal Name
1	Blue	CHANNEL A
2	Brown	CHANNEL $\overline{A}$
3	Green	CHANNEL B
4	Purple	CHANNEL $\overline{B}$
5	White	CHANNEL C
6	Yellow	CHANNEL $\overline{C}$
7	Red	+5V
8	Black	0V
9	Black	Shield

Connector Connection Of Amplifier Side

PIN No.	LEAD COLR	Signal Name
1	Blue	CHANNEL A
2	Brown	CHANNEL $\overline{A}$
3	Green	CHANNEL B
4	Purple	CHANNEL $\overline{B}$
5	White	CHANNEL C
6	Yellow	CHANNEL $\overline{C}$
7	Red	+5V
8	Black	0V
9	Black	Shield
10	N.C.	—
11	Blue	SDN
12	Black	GND
13	Yellow	LIMIT
14	Black	GND
15	Red	Vcc
16	Red	Vcc

④ I/O Cable (unshielded)



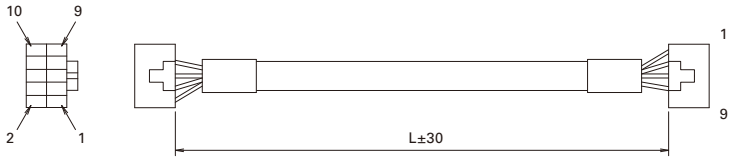
Cable Connection

Cable 1	Cable 2
A1-No.1	B1-No.17
A2-No.2	B2-No.18
A3-No.3	B3-No.19
A4-No.4	B4-No.20
A5-No.5	B5-No.21
•	•
•	•
•	•
•	•
A13-No.13	B13-No.29
A14-No.14	B14-No.30
A15-No.15	B15-No.31
A16-No.16	B16-No.32

Connector Set:PBC4S0000A

Manufacturer	Type	Qty.
KEL	Housing: 8822E-032-171D-F	1

⑤ Communication Cable



Connector relay cable

Signal Name	CNA Pin.No.		CNB Pin.No.	Signal Name
A	1	Yellow	1	A
B	2	White	2	B
(Y)	3	Brown	3	(Y)
(Z)	4	Blue	4	(Z)
GND	5	Black	5	GND
Vcc	6	Red	6	Vcc
(STOP)(EXE2)	7	Purple	7	(STOP)(EXE2)
FG	8	Green	8	FG
—	9	Drain	9	—
—	10		10	—

Connector Set:PBC4C0000A

Manufacturer	Type	Qty.
JST	Housing: PADP-10V-1-S	1
	Contact: SPH-002T-P0.5L	10

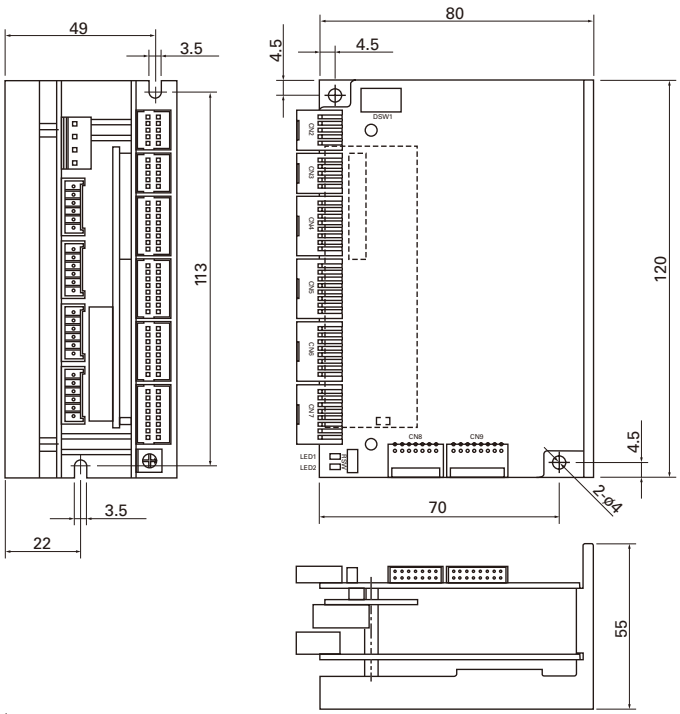
Model No. PB Type R　Multi-Axis Type

DC Power Input Type

General Specifications

Amplifier Model			PB2D003R1U△
Control Mode			PWM Control　Trapezoidal drive method
Power Supply	Main Power Supply Control Power Supply		DC24V/36V±10% DC24V±10% (only for part numbers ending with "1" or "3")
Environment	Ambient temp.	Operating	0 to 55°C
		Storage	−20 to 70°C
	Operating/ Storage Humidity		90% RH (non-condensing)
	Vibration Resistance		0.5G (tested with frequency range 10 to 55 Hz, X, Y, Z each direction 2H)
Structure			Open Frame
Mass/Dimensions			Approx. 0.8kg　W120×H55×D80
Functions	Rotation Speed		0 to 4500min^{-1}
	Resolution (P/R)		200, 800, 1600, 3200, 6400, 12800
	Regeneration Process		Not available (External regenerative unit is optional)
	Protective Functions		Over-voltage, Regenerated voltage overload, Over-speed, Encoder disconnection, Reset error, CPU error, Overload stop, Soft Servo Error, Amplifier Overheat
	Display		Power status, Alarm (flashing indicator)
	Functions		Operation Functions: Normal Drive (incremental move , absolute move) , Zero-return, push operation Point Function: 256Point Program Function: 256PRG×16Line 8PRG×512LINE
	Switch		DIP SW1,2: Transmission Speed Setting DIP SW3 to 6: Axis valid / invalid (On: Activate) DIP SW7 to 10: Terminating Resistor Setting (On: with terminating resistance) Rotary SW: Node Adress Setting (0 to E)
Input/ Output Signals	Input Signals		CN1 Fixed function : EXE, Point (4), SELECT, STOP, ALMCLR CN1 Selectable (4): Generic Input, Point, Pause, Interlock CN4 to CN7 Allocation Function (2 x 4-axis) Hard.Limit (SDN) Signal Input signal: DC5V to 24V Limit sensor (CN4 to 7 Pin.No.11,13): Inside 5V Pull Up
	Output Signals		CN1 Fixed function In-Position, Ack, Busy, ALM CN1Selectable (8) Generic Output, Motor Stop, H.Limit Monitor, ZONE, Zero-return completion, END, STOP Monitor, SDN Monitor Output signal: Open collector DC30V / 30mA max
	Communication Specifications		RS-485 Standard　Start-Stop Synchronization, Half Duplex (Part numbers ending with "0" or "1") RS-485 Standard　Start-Stop Synchronization, Full Duplex (Part numbers ending with "2" or "3")

Amplifier Dimensional Drawing　(Unit:mm)



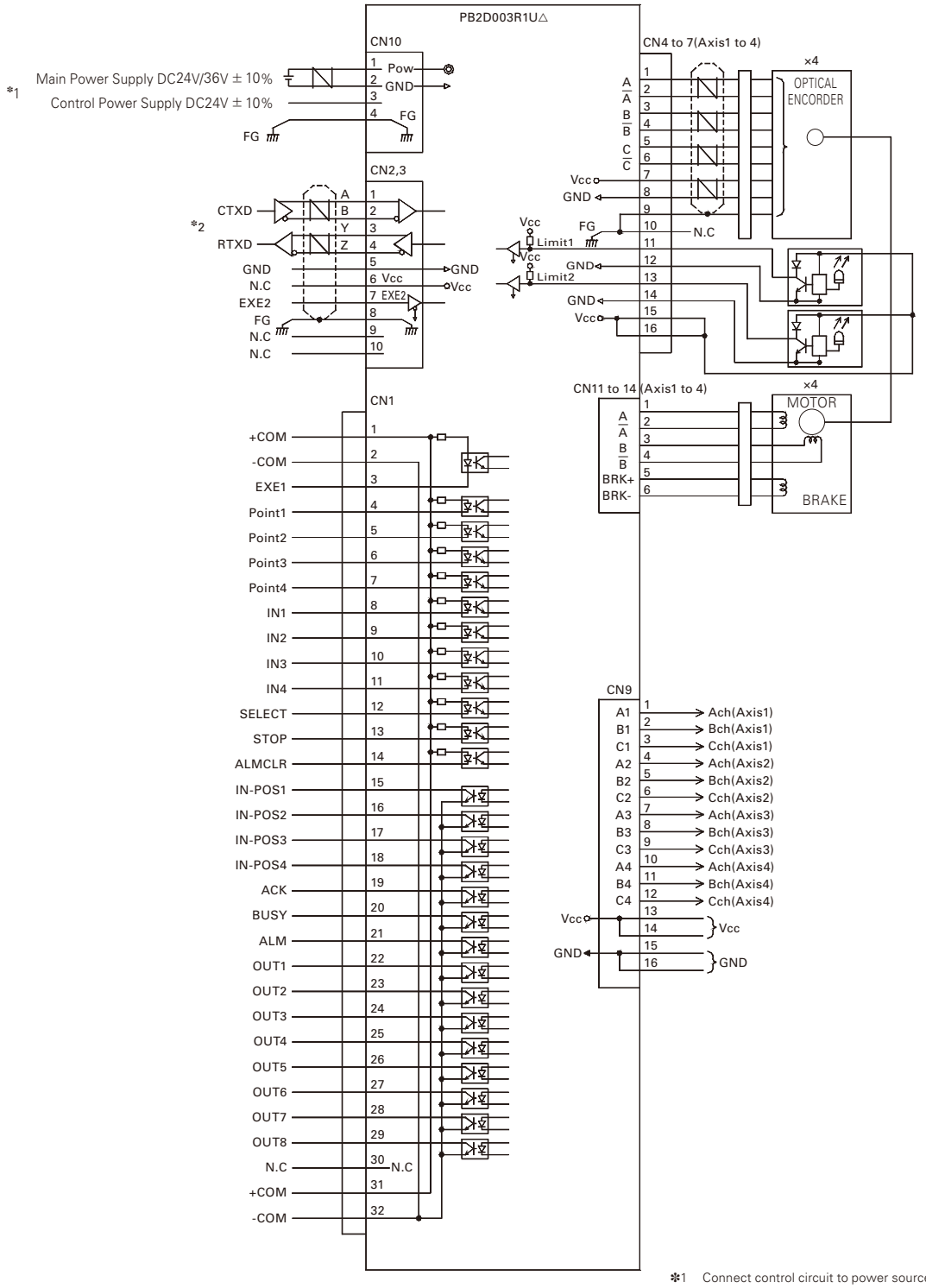
Amplifier Model Number Nomenclature

PB2D003R1U△

△	Communication Specifications	Power Input
0	Start-Stop Synchronization, Half Duplex	Single Power
1		Separate
2	Start-Stop Synchronization, Full Duplex	Single Power
3		Separate

Note : Operation of the holding brake is not available when the single input voltage amplifier is used at 36V input voltage. If operation of the holding brake is required at 36V input voltage, please use the separate power type amplifier, and set control voltage at 24V.

External Wiring Diagram



✻1 Connect control circuit to power source only for models with part numbers ending with "1" or "3".

✻2 Please check individual specifications for each part number, as communication specifications differ according to amplifier model.

Note 1: The CN1 general-purpose input/output signal function is selected through communication. Please see the basic specifications for details.

General Specifications

Standard Model AC

Motor Flange Size

□42 □60 □86

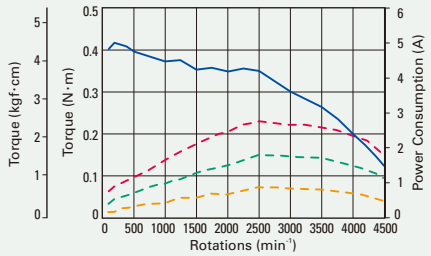
Size	Motor Flange Size	□42mm		□60mm			
	Motor Length	55.9mm		70.3mm		102.3mm	
Motor Model	Unit	PBM423FXK20-M		PBM603FXK20-M		PBM604FXK20-M	
Type R Set Model No.		PBBR423	PBCR423	PBBR603	PBCR603	PBBR604	PBCR604
Related Amplifier Model No.		PB4A002R30□					
Type P Set Model No.		PBBP423	PBCP423	PBBP603	PBCP603	PBBP604	PBCP604
Related Amplifier Model No.		PB4A002P30□					
MAX. Stall Torque	N·m	0.35		1.3		1.9	
Rotor Inertia	$\times 10^{-4}$kg·m^2	0.056		0.4		0.84	
Allowable Thrust Load	N	9.8		14.7			
Allowable Radial Load Note1	N	47		190			
Motor Mass	kg	0.35		0.85		1.42	
Motor Characteristics Chart	Type R	①		②		③	
	Type P						

Motor Characteristics Chart

Torque AC100V/200V ——— Power Consumption Single-phase AC100V - - - - - - Single-phase AC200V - - - - - - 3-phase AC200V - - - - - -

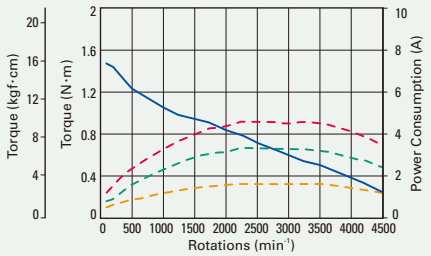
① Motor Model PBM423FXK20-M

Type R Type P



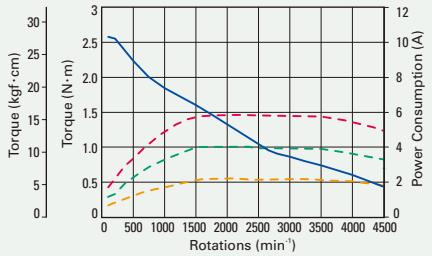
② Motor Model PBM603FXK20-M

Type R Type P



③ Motor Model PBM604FXK20-M

Type R Type P

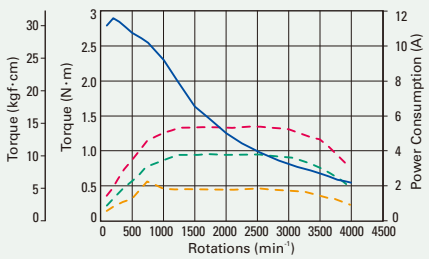


✻Maintain motor case temperature at a point below 85°C.
Note1: The load point is the output shaft end edge.

□86mm			
79.5mm		109.1mm	
PBM861FXK20-M		PBM862FXK20-M	
PBBR861	PBCR861	PBBR862	PBCR862
PB4A002R30□			
PBBP861	PBCP861	PBBP862	PBCP862
PB4A002P30□			
3.1		6.1	
1.48		3	
60			
200			
1.9		3.1	
④		⑤	

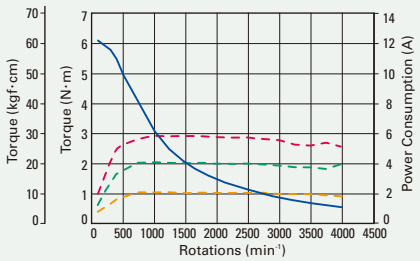
④ Motor Model PBM861FXK20-M

Type R Type P



⑤ Motor Model PBM862FXK20-M

Type R Type P



General Specifications

Standard Model DC

Motor Flange Size

□28 □42 □60

Size	Motor Flange Size	□28mm		□42mm
	Motor Length	58.5mm	77.8mm	57.6mm
Motor Model	Unit	PBM282FXE20	PBM284FXE20	PBM423FXE20
Type M Set Model No.		PBDM282	PBDM284	PBDM423
Related Amplifier Model No.		PB3D003M200		
Motor Model	Unit	PBM282DXA20	PBM284DXA20	PBM423DXA20
Type R Multi-axis Model No.		PB2D003R1U△		
MAX. Stall Torque	N·m	0.05	0.155	0.39
Rotor Inertia	$\times 10^{-4}$kg·m^2	0.008	0.016	0.056
Allowable Thrust Load	N	9.8		9.8
Allowable Radial Load Note1	N	33		49
Motor Mass	kg	0.16	0.23	0.35
Motor Characteristics Chart	Type M	①	③	⑤
	Type R Multi-Axis	②	④	⑥

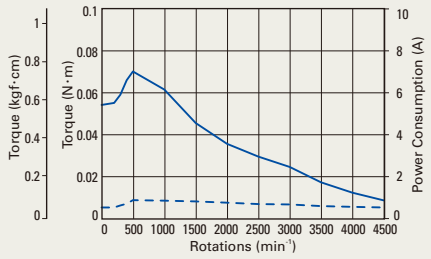
Motor Characteristics Chart

Type M Torque DC24V DC48V Power Consumption DC24V DC48V

Type R Multi-Axis Torque DC24V DC36V

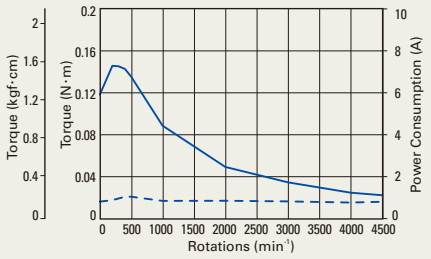
① Motor Model PBM282FXE20

Type M



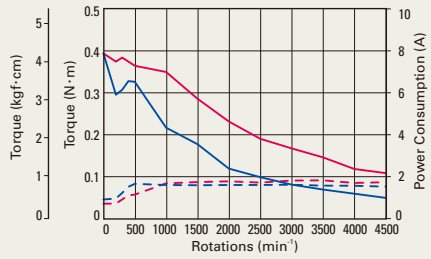
③ Motor Model PBM284FXE20

Type M



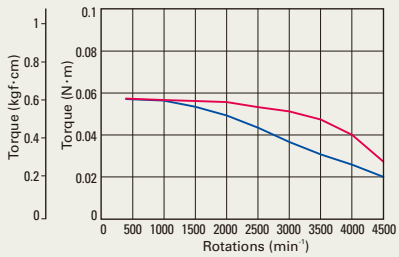
⑤ Motor Model PBM423FXE20

Type M



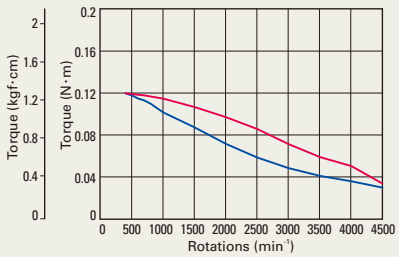
②Motor Model PBM282DXA20

Type R Multi-Axis



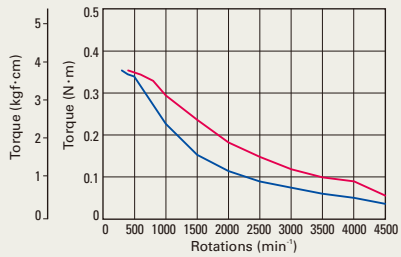
④ Motor Model PBM284DXA20

Type R Multi-Axis



⑥ Motor Model PBM423DXA20

Type R Multi-Axis



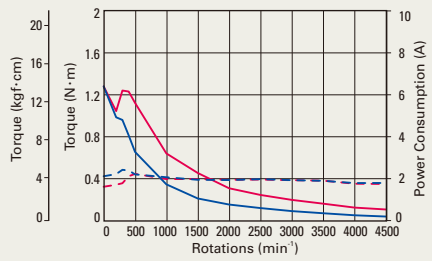
✻Maintain motor case temperature at a point below 85°C.

Note1: The load point is determined at a position 14mm from the mounting surface.

□60mm	
70.3mm	102.3mm
PBM603FXE20	PBM604FXE20
PBDM603	PBDM604
PB3D003M200	
PBM603DXA20	PBM604DXA20
PB2D003R1U△	
1.3	1.9
0.4	0.84
14.7	
167	
0.85	1.42
⑦	⑨
⑧	⑩

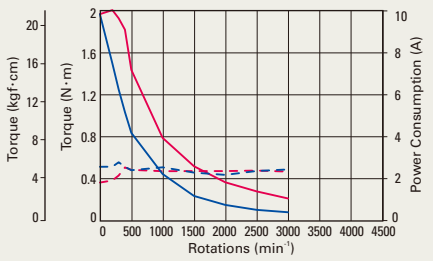
⑦ Motor Model PBM603FXE20

Type M



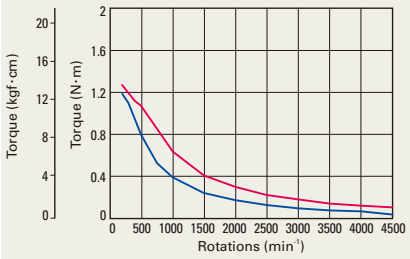
⑨ Motor Model PBM604FXE20

Type M



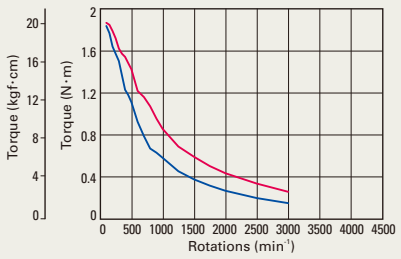
⑧ Motor Model PBM603DXA20

Type R Multi-Axis



⑩ Motor Model PBM604DXA20

Type R Multi-Axis



General Specifications

Low-backlash Gear Model AC

Motor Flange Size

□42 □60

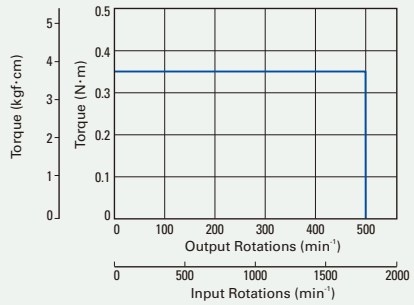
Size	Motor Flange Size	□42mm					
	Motor Length + Gear Length	86.1mm					
Motor Model	Unit	PBM423FGAK20-M		PBM423FGBK20-M		PBM423FGEK20-M	
Type R Set Model No.		PBBR423-C3.6	PBCR423-C3.6	PBBR423-C7.2	PBCR423-C7.2	PBBR423-C10	PBCR423-C10
Related Amplifier Model No.		PB4A002R30□					
Type P Set Model No.		PBBP423-C3.6	PBCP423-C3.6	PBBP423-C7.2	PBCP423-C7.2	PBBP423-C10	PBCP423-C10
Related Amplifier Model No.		PB4A002P30□					
MAX. Stall Torque	N·m	0.343		0.686		0.98	
Rotor Inertia	$\times10^{-4}$kg·m^2	0.056					
Reduction Gear Ratio		1:3.6		1:7.2		1:10	
Backlash	DEG	0.6		0.4		0.35	
Allowable Rotations	min^{-1}	500		250		180	
Rotation Direction	Rel. to command dir.	Forward					
Allowable Thrust Load	N	15					
Allowable Radial Load Note1	N	20					
Motor Mass	kg	0.48					
Motor Characteristics Chart	Type R	①		②		③	
	Type P						

Motor Characteristics Chart

Allowable Torque AC100V/200V

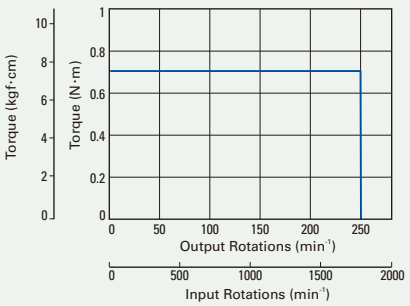
① Motor Model PBM423FGAK20-M

Type R Type P



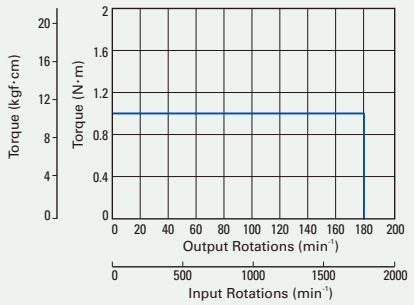
② Motor Model PBM423FGBK20-M

Type R Type P



③ Motor Model PBM423FGEK20-M

Type R Type P



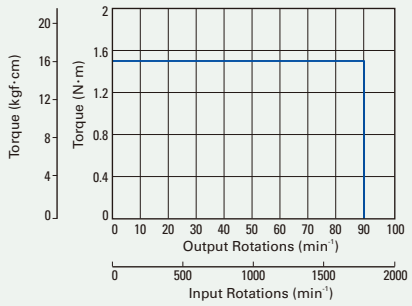
✻Maintain motor case temperature at a point below 85°C.

Note1: The load point is determined at a position 1/3 of the length from the output shaft.

□42mm			
86.1mm			
PBM423FGGK20-M		PBM423FGJK20-M	
PBBR423-C20	PBCR423-C20	PBBR423-C30	PBCR423-C30
PB4A002R30□			
PBBP423-C20	PBCP423-C20	PBBP423-C30	PBCP423-C30
PB4A002P30□			
1.47			
0.056			
1:20		1:30	
0.25			
90		60	
Forward			
15			
20			
0.48			
④		⑤	

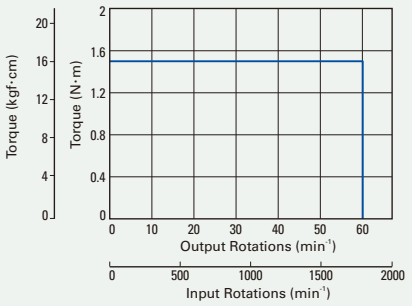
④ Motor Model PBM423FGGK20-M

Type R Type P



⑤ Motor Model PBM423FGJK20-M

Type R Type P



General Specifications

Low-backlash Gear Model AC

Motor Flange Size

□42 □60

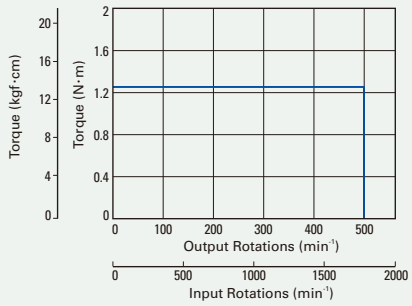
Size	Motor Flange Size	□60mm					
	Motor Length + Gear Length	114.3mm					
Motor Model	Unit	PBM603FGAK20-M		PBM603FGBK20-M		PBM603FGEK20-M	
Type R Set Model No.		PBBR603-C3.6	PBCR603-C3.6	PBBR603-C7.2	PBCR603-C7.2	PBBR603-C10	PBCR603-C10
Related Amplifier Model No.		PB4A002R30□					
Type P Set Model No.		PBBP603-C3.6	PBCP603-C3.6	PBBP603-C7.2	PBCP603-C7.2	PBBP603-C10	PBCP603-C10
Related Amplifier Model No.		PB4A002P30□					
MAX. Stall Torque	N·m	1.25		2.5		3	
Rotor Inertia	$\times10^{-4}$kg·m^2	0.4					
Reduction Gear Ratio		1:3.6		1:7.2		1:10	
Backlash	DEG	0.55		0.25			
Allowable Rotations	min^{-1}	500		250		180	
Rotation Direction	Rel. to command dir.	Forward				Reverse	
Allowable Thrust Load	N	30					
Allowable Radial Load Note1	N	100					
Motor Mass	kg	1.22					
Motor Characteristics Chart	Type R	①		②		③	
	Type P						

Motor Characteristics Chart

Allowable Torque AC100V/200V

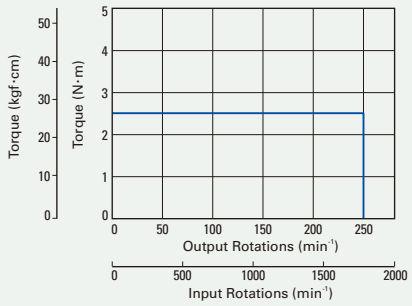
① Motor Model PBM603FGAK20-M

Type R Type P



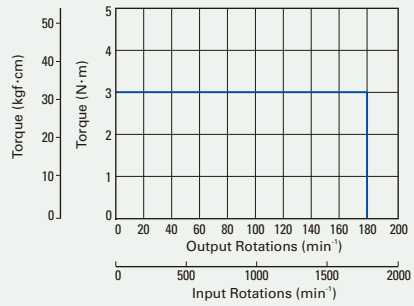
② Motor Model PBM603FGBK20-M

Type R Type P



③ Motor Model PBM603FGEK20-M

Type R Type P



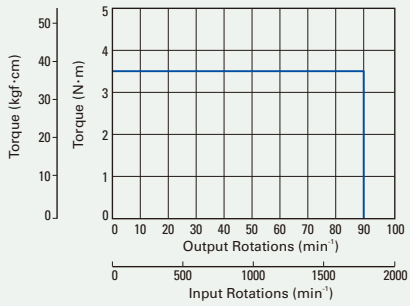
✻Maintain motor case temperature at a point below 85°C.

Note1: The load point is determined at a position 1/3 of the length from the output shaft.

□60mm			
114.3mm			
PBM603FGGK20-M		PBM603FGJK20-M	
PBBR603-C20	PBCR603-C20	PBBR603-C30	PBCR603-C30
PB4A002R30□			
PBBP603-C20	PBCP603-C20	PBBP603-C30	PBCP603-C30
PB4A002P30□			
3.5		4	
0.4			
1:20		1:30	
0.17			
90		60	
Reverse			
30			
100			
1.22			
④		⑤	

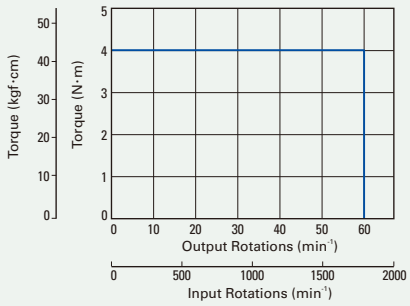
④ Motor Model PBM603FGGK20-M

Type R Type P



⑤ Motor Model PBM603FGJK20-M

Type R Type P



General Specifications

Low-backlash Gear Model DC

Motor Flange Size

□42 □60

Size	Motor Flange Size	□42mm		
	Motor Length + Gear Length	87.9mm		
Motor Model	Unit	PBM423FGAE20	PBM423FGBE20	PBM423FGEE20
Type M Set Model No.		PBDM423-C3.6	PBDM423-C7.2	PBDM423-C10
Related Amplifier Model No.		PB3D003M200		
Motor Model	Unit	PBM423DGAA20	PBM423DGBA20	PBM423DGEA20
Type R Multi-axis Model No.		PB2D003R1U△		
MAX. Stall Torque	N·m	0.343	0.686	0.98
Rotor Inertia	$\times 10^{-4}$kg·m^2	0.056		
Reduction Gear Ratio		1:3.6	1:7.2	1:10
Backlash	DEG	0.6	0.4	0.35
Allowable Rotations	min^{-1}	500	250	180
Rotation Direction	Rel. to command dir.	Forward		
Allowable Thrust Load	N	15		
Allowable Radial Load Note1	N	20		
Motor Mass	kg	0.48		
Motor Characteristics Chart	Type M	①	③	⑤
	Type R Multi-Axis	②	④	⑥

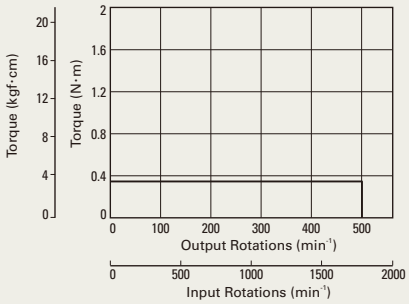
Motor Characteristics Chart

Type M Allowable Torque DC24V DC48V DC24V/48V

Type R Multi-Axis Allowable Torque DC24V DC36V DC24V/36V

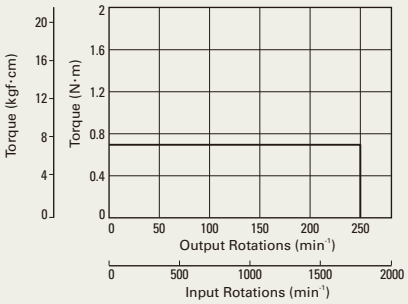
① Motor Model PBM423FGAE20

Type M



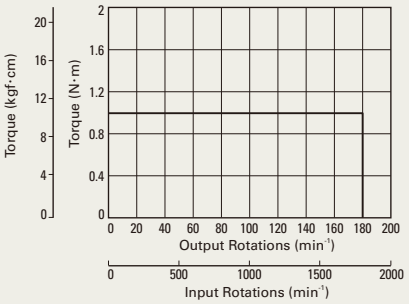
③ Motor Model PBM423FGBE20

Type M



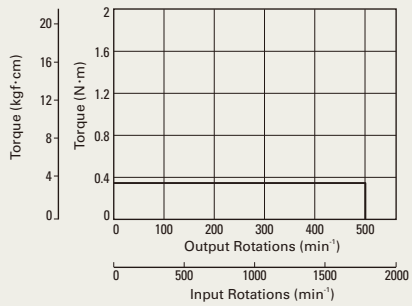
⑤ Motor Model PBM423FGEE20

Type M



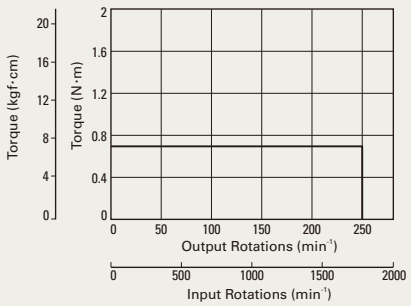
②Motor Model PBM423DGAA20

Type R Multi-Axis



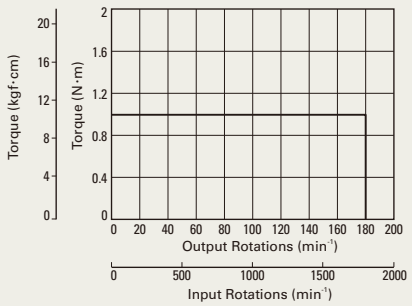
④ Motor Model PBM423DGBA20

Type R Multi-Axis



⑥ Motor Model PBM423DGEA20

Type R Multi-Axis



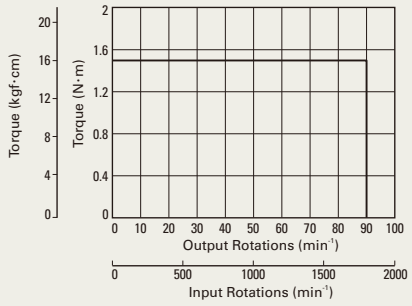
✻Maintain motor case temperature at a point below 85°C.

Note1: The load point is determined at a position 1/3 of the length from the output shaft.

□42mm	
87.9mm	
PBM423FGGE20	PBM423FGJE20
PBDM423-C20	PBDM423-C30
PB3D003M200	
PBM423DGGA20	PBM423DGJA20
PB2D003R1U△	
1.47	
0.056	
1:20	1:30
0.25	0.25
90	60
Reverse	
15	
20	
0.48	
⑦	⑨
⑧	⑩

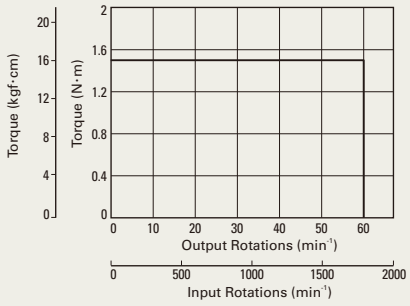
⑦ Motor Model PBM423FGGE20

Type M



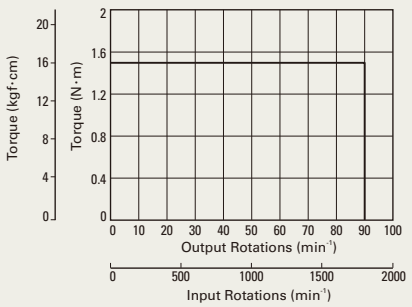
⑨ Motor Model PBM423FGJE20

Type M



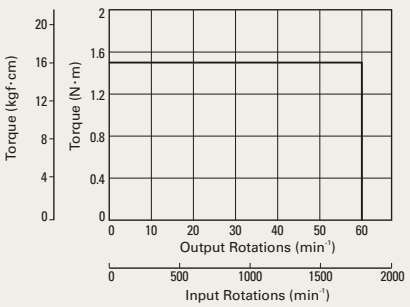
⑧ Motor Model PBM423DGGA20

Type R Multi-Axis



⑩ Motor Model PBM423DGJA20

Type R Multi-Axis



General Specifications

Low-backlash Gear Model DC

Motor Flange Size

□42 □60

Size	Motor Flange Size	□60mm		
	Motor Length + Gear Length	115.8mm		
Motor Model	Unit	PBM603FGAE20	PBM603FGBE20	PBM603FGEE20
Type M Set Model No.		PBDM603-C3.6	PBDM603-C7.2	PBDM603-C10
Related Amplifier Model No.		PB3D003M200		
Motor Model	Unit	PBM603DGAA20	PBM603DGBA20	PBM603DGEA20
Type R Multi-axis Model No.		PB2D003R1U△		
MAX. Stall Torque	N·m	1.25	2.5	3
Rotor Inertia	$\times 10^{-4}$kg·m^2	0.4		
Reduction Gear Ratio		1:3.6	1:7.2	1:10
Backlash	DEG	0.55	0.25	
Allowable Rotations	min^{-1}	500	250	180
Rotation Direction	Rel. to command dir.	Forward		Reverse
Allowable Thrust Load	N	30		
Allowable Radial Load Note1	N	100		
Motor Mass	kg	1.22		
Motor Characteristics Chart	Type M	①	③	⑤
	Type R Multi-Axis	②	④	⑥

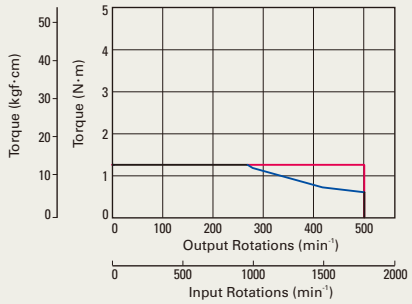
Motor Characteristics Chart

Type M Allowable Torque DC24V DC48V DC24V/48V

Type R Multi-Axis Allowable Torque DC24V DC36V DC24V/36V

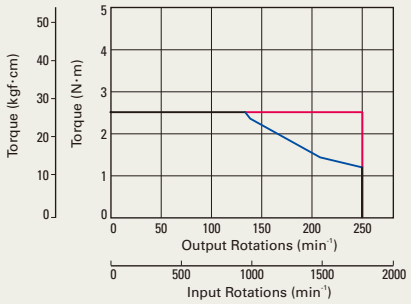
① Motor Model PBM603FGAE20

Type M



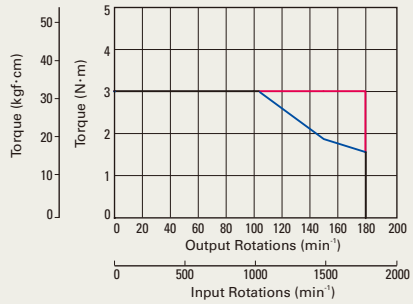
③ Motor Model PBM603FGBE20

Type M



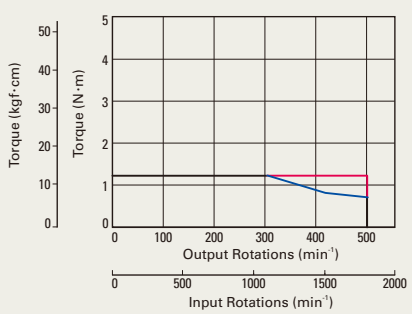
⑤ Motor Model PBM603FGEE20

Type M



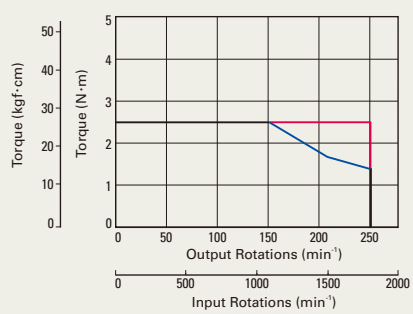
②Motor Model PBM603DGAA20

Type R Multi-Axis



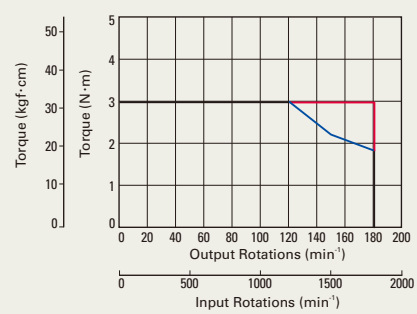
④ Motor Model PBM603DGBA20

Type R Multi-Axis



⑥ Motor Model PBM603DGEA20

Type R Multi-Axis



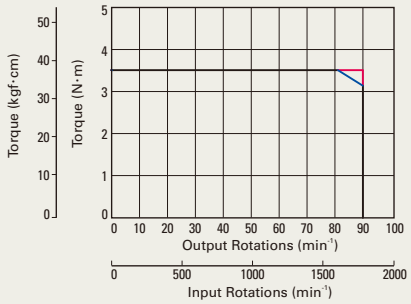
✻Maintain motor case temperature at a point below 85°C.

Note1: The load point is determined at a position 1/3 of the length from the output shaft.

□60mm	
115.8mm	
PBM603FGGE20	PBM603FGJE20
PBDM603-C20	PBDM603-C30
PB3D003M200	
PBM603DGGA20	PBM603DGJA20
PB2D003R1U△	
3.5	4
0.4	
1:20	1:30
0.17	
90	60
Reverse	
30	
100	
1.22	
⑦	⑨
⑧	⑩

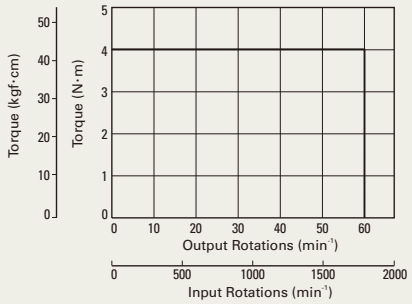
⑦ Motor Model PBM603FGGE20

Type M



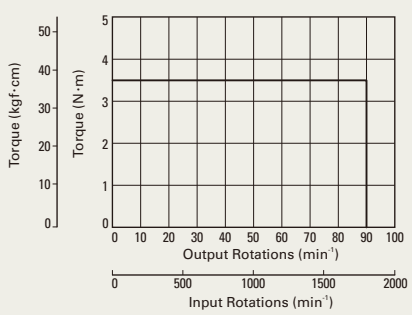
⑨ Motor Model PBM603FGJE20

Type M



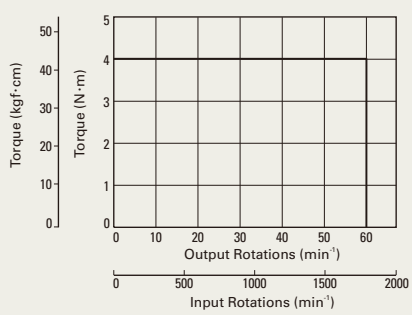
⑧ Motor Model PBM603DGGA20

Type R Multi-Axis



⑩ Motor Model PBM603DGJA20

Type R Multi-Axis



General Specifications

Harmonic Gear Model AC

Motor Flange Size

□42 □60

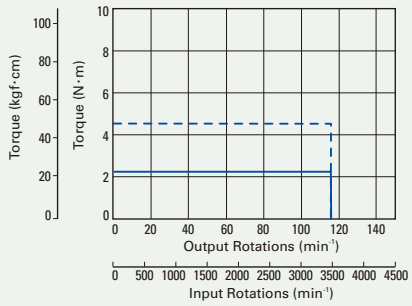
Size	Motor Flange Size	□42mm		
	Motor Length + Gear Length	95.1mm		
Motor Model	Unit	PBM423FHJK20-M	PBM423FHLK20-M	PBM423FHMK20-M
Type R Set Model No.		PBBR423-H30 / PBCR423-H30	PBBR423-H50 / PBCR423-H50	PBBR423-H100 / PBCR423-H100
Related Amplifier Model No.		PB4A002R30□		
Type P Set Model No.		PBBP423-H30 / PBCP423-H30	PBBP423-H50 / PBCP423-H50	PBBP423-H100 / PBCP423-H100
Related Amplifier Model No.		PB4A002P30□		
MAX. Stall Torque	N·m	2.2	3.5	5
Allow. Instantaneous Torque	N·m	4.5	8.3	11
Rotor Inertia	$\times10^{-4}$kg·m^2	0.068		
Reduction Gear Ratio		1:30	1:50	1:100
Lost Motion	min	–		
Hysteresis Loss	min	3.6	2.4	
Allowable Rotations	min^{-1}	116	70	35
Allowable Thrust Load	N	1150		
Allowable Radial Load Note1	N	209		
Motor Mass	kg	0.54		
Motor Characteristics Chart	Type R	①	②	③
	Type P			

Motor Characteristics Chart

Allowable Torque Single-phase AC100V/200V ——— Allow. Instantaneous Torque Single-phase, 3-phase AC100V/200V - - - - - - - -

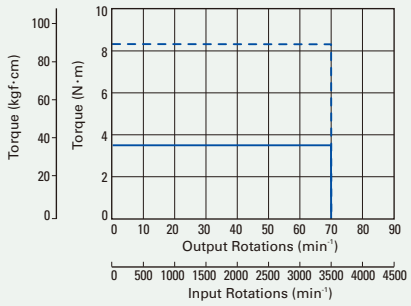
① Motor Model PBM423FHJK20-M

Type R Type P



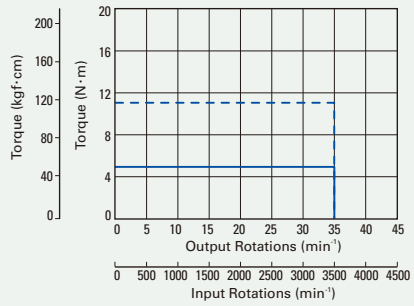
② Motor Model PBM423FHLK20-M

Type R Type P



③ Motor Model PBM423FHMK20-M

Type R Type P

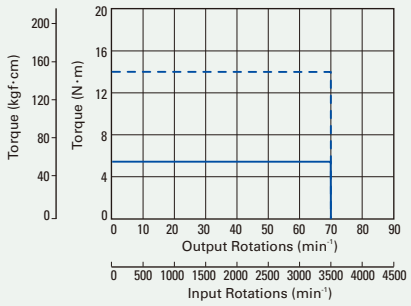


✻Maintain motor case temperature at a point below 85°C.
✻The gear output shaft rotates in the opposite direction.
Note1: The load point is determined at a position 1/3 of the length from the output shaft.

□60mm	
135.8mm	
PBM603FHLK20-M	PBM603FHMK20-M
PBBR603-H50 / PBCR603-H50	PBBR603-H100 / PBCR603-H100
PB4A002R30□	
PBBP603-H50 / PBCP603-H50	PBBP603-H100 / PBCP603-H100
PB4A002P30□	
5.5	8
14	20
0.435	
1:50	1:100
0.4 to 3 [±0.28N·m]	0.4 to 3 [±0.4N·m]
–	
70	35
400	
360	
1.45	
④	⑤

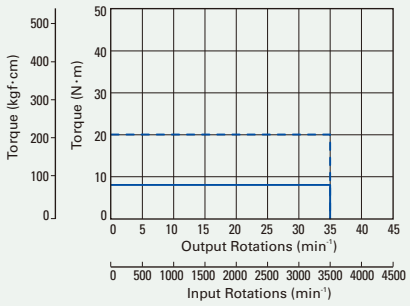
④ Motor Model PBM603FHLK20-M

Type R Type P



⑤ Motor Model PBM603FHMK20-M

Type R Type P



General Specifications

Harmonic Gear Model DC

Motor Flange Size

□28 □42

Size	Motor Flange Size	□28mm		□42mm
	Motor Length + Gear Length	97mm		97mm
Motor Model	Unit	PBM282FHLE20	PBM282FHME20	PBM423FHJE20
Type M Set Model No.		PBDM282-H50	PBDM282-H100	PBDM423-H30
Related Amplifier Model No.		PB3D003M200		
Motor Model	Unit	PBM282DHLA20	PBM282DHMA20	PBM423DHJA20
Type R Multi-axis Model No.		PB2D003R1U△		
MAX. Stall Torque	N·m	1.5	2	2.2
Allow. Instantaneous Torque	N·m	2.7	3.6	4.5
Rotor Inertia	$\times 10^{-4}$kg·m^2	0.012		0.068
Reduction Gear Ratio		1:50	1:100	1:30
Lost Motion	min	0.4 to 3 [±0.06N·m]	0.4 to 3 [±0.08N·m]	–
Hysteresis Loss	min	–	–	3.6
Allowable Rotations	min^{-1}	70	35	116
Allowable Thrust Load	N	100		1150
Allowable Radial Load Note1	N	160		209
Motor Mass	kg	0.27		0.54
Motor Characteristics Chart	Type M	①	③	⑤
	Type R Multi-Axis	②	④	⑥

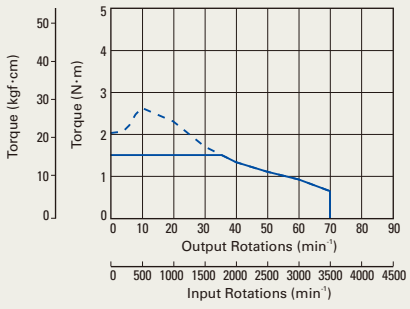
Motor Characteristics Chart

Type M — Allowable Torque DC24V —— DC48V —— DC24V/48V —— Allow. Instantaneous Torque DC24V ----- DC48V ----- DC24V/48V -----

Type R Multi-Axis — Allowable Torque DC24V —— DC36V —— DC24V+36V —— Allow. Instantaneous Torque DC24V ----- DC36V ----- DC24V/36V -----

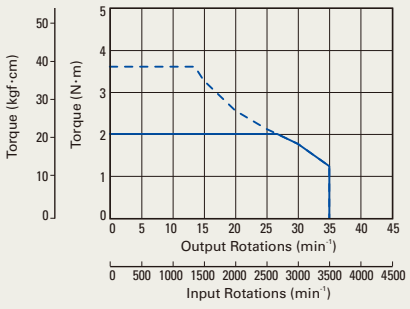
① Motor Model PBM282FHLE20

Type M



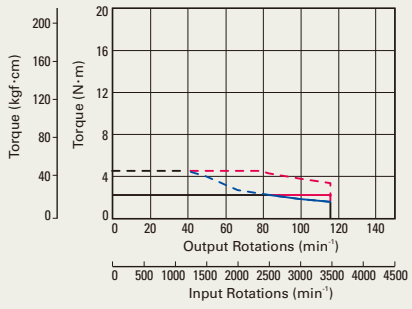
③ Motor Model PBM282FHME20

Type M



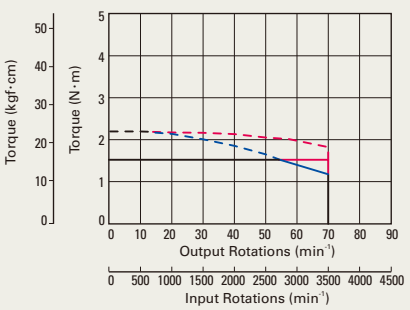
⑤ Motor Model PBM423FHJE20

Type M



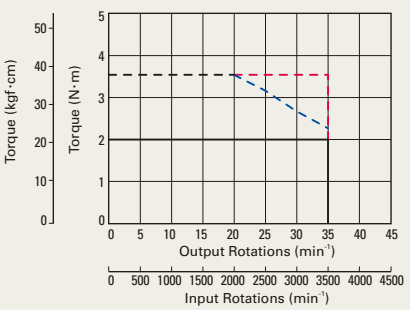
②Motor Model PBM282DHLA20

Type R Multi-Axis



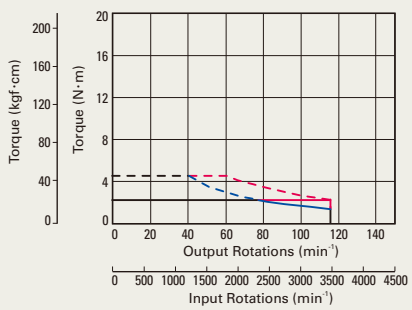
④ Motor Model PBM282DHMA20

Type R Multi-Axis



⑥ Motor Model PBM423DHJA20

Type R Multi-Axis

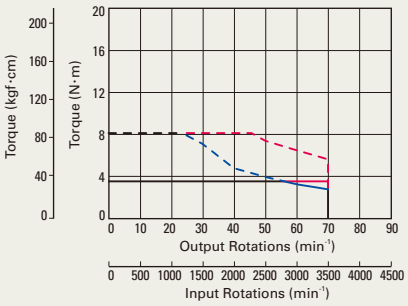


✻Maintain motor case temperature at a point below 85°C. ✻The gear output shaft rotates in the opposite direction. Note1: The load point is determined at a position 1/3 of the length from the output shaft.

□42mm	
97mm	
PBM423FHLE20	PBM423FHME20
PBDM423-H50	PBDM423-H100
PB3D003M200	
PBM423DHLA20	PBM423DHMA20
PB2D003R1U△	
3.5	5
8.3	11
0.068	
1:50	1:100
–	
2.4	
70	35
1150	
209	
0.54	
⑦	⑨
⑧	⑩

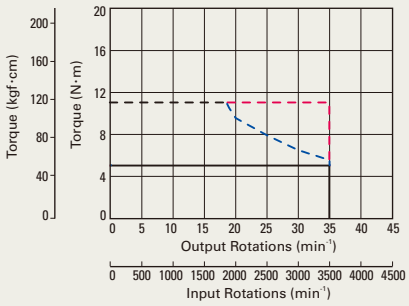
⑦ Motor Model PBM423FHLE20

Type M



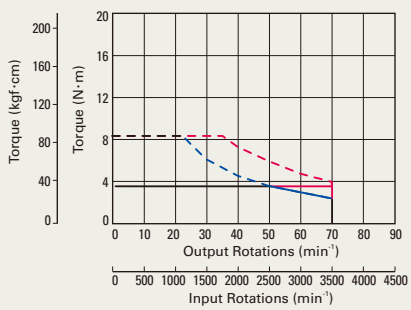
⑨ Motor Model PBM423FHME20

Type M



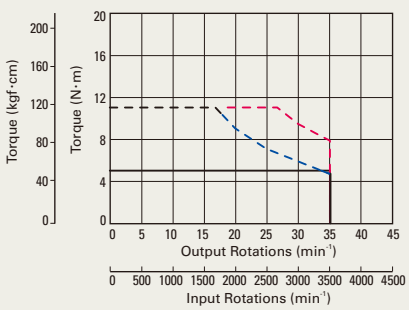
⑧ Motor Model PBM423DHLA20

Type R Multi-Axis



⑩ Motor Model PBM423DHMA20

Type R Multi-Axis



General Specifications

Harmonic Gear Model DC

Motor Flange Size

□60

Size	Motor Flange Size	□60mm	
	Motor Length + Gear Length	137.3mm	
Motor Model	Unit	PBM603FHLE20	PBM603FHME20
Type M Set Model No.		PBDM603-H50	PBDM603-H100
Related Amplifier Model No.		PB3D003M200	
Motor Model	Unit	PBM603DHLA20	PBM603DHMA20
Type R Multi-axis Model No.		PB2D003R1U△	
MAX. Stall Torque	N·m	5.5	8
Allow. Instantaneous Torque	N·m	14	20
Rotor Inertia	$\times 10^{-4}$kg·m^2	0.435	
Reduction Gear Ratio		1:50	1:100
Lost Motion	min	0.4 to 3 [±0.28N·m]	0.4 to 3 [±0.4N·m]
Hysteresis Loss	min	–	
Allowable Rotations	min^{-1}	70	35
Allowable Thrust Load	N	400	
Allowable Radial Load Note1	N	360	
Motor Mass	kg	1.45	
Motor Characteristics Chart	Type M	①	③
	Type R Multi-Axis	②	④

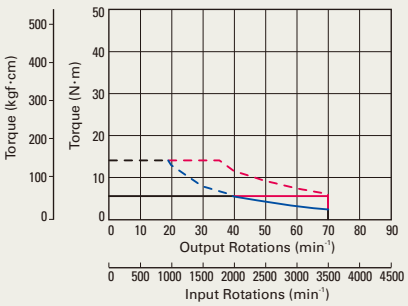
Motor Characteristics Chart

Type M Allowable Torque DC24V —— DC48V —— DC24V/48V —— Allow. Instantaneous Torque DC24V ----- DC48V ----- DC24V/48V -----

Type R Multi-Axis Allowable Torque DC24V —— DC36V —— DC24V+36V —— Allow. Instantaneous Torque DC24V ----- DC36V ----- DC24V/36V -----

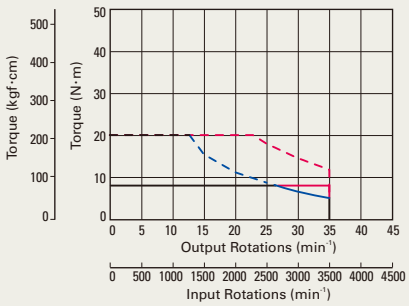
① Motor Model PBM603FHLE20

Type M



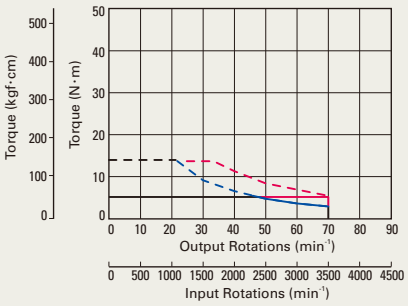
③ Motor Model PBM603FHME20

Type M



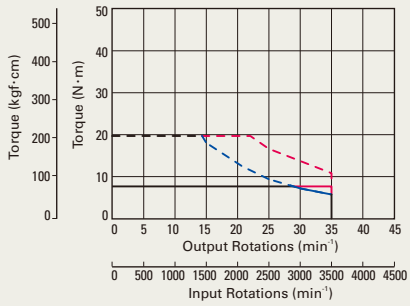
②Motor Model PBM603DHLA20

Type R Multi-Axis



④ Motor Model PBM603DHMA20

Type R Multi-Axis



✻Maintain motor case temperature at a point below 85°C.
✻The gear output shaft rotates in the opposite direction.
Note1: The load point is determined at a position 1/3 of the length from the output shaft.

General Specifications

Electromagnetic Brake Model AC

Motor Flange Size

□42 □60

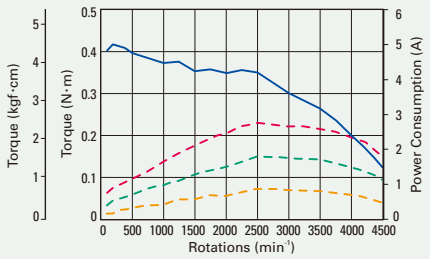
Size	Motor Flange Size	□42mm		□60mm			
	Motor Length + Brake Length	88.3mm		113.6mm		145.6mm	
Motor Model	Unit	PBM423FCK20-M		PBM603FCK20-M		PBM604FCK20-M	
Type R Set Model No.		PBBR423-B	PBCR423-B	PBBR603-B	PBCR603-B	PBBR604-B	PBCR604-B
Related Amplifier Model No.		PB4A002R30□					
Type P Set Model No.		PBBP423-B	PBCP423-B	PBBP603-B	PBCP603-B	PBBP604-B	PBCP604-B
Related Amplifier Model No.		PB4A002P30□					
MAX. Stall Torque	N·m	0.39		1.3		1.9	
Rotor Inertia	$\times 10^{-4}$kg·m^2	0.056		0.4		0.84	
Allowable Thrust Load	N	9.8		14.7			
Allowable Radial Load Note1	N	47		190			
Motor Mass	kg	0.5		1.19		1.76	
Electromagnetic Brake: Operation Method		No excitation actuating type					
Electromagnetic Brake: Power Voltage	V	DC24V±5%					
Electromagnetic Brake: Excitation Current	A	0.08		0.25			
Electromagnetic Brake: Power Consumption	W	2		6			
Electromagnetic Brake: Friction Torque	N·m	0.3		0.78			
Electromagnetic Brake: Brake Engage Time	ms	20		20			
Electromagnetic Brake: Brake Release Time	ms	30		30			
Motor Characteristics Chart	Type R	①		②		③	
	Type P						

Motor Characteristics Chart

Torque AC100V/200V ——— Power Consumption Single-phase AC100V - - - - - Single-phase AC200V - - - - - 3-phase AC200V - - - - -

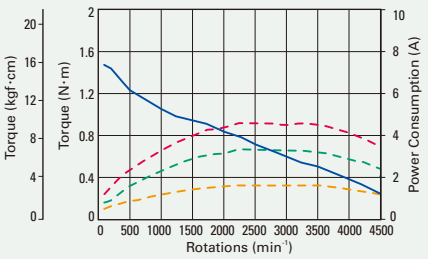
① Motor Model PBM423FCK20-M

Type R Type P



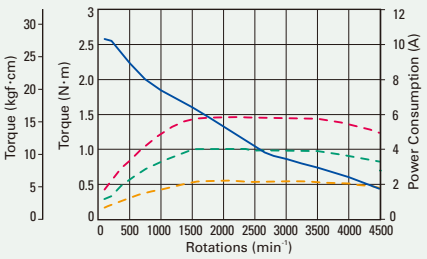
② Motor Model PBM603FCK20-M

Type R Type P



③ Motor Model PBM604FCK20-M

Type R Type P



✻Maintain motor case temperature at a point below 85°C.
Note1: The load point is the output shaft end edge.

General Specifications

Electromagnetic Brake Model DC

Motor Flange Size

□28 □42 □60

Size	Motor Flange Size	□28mm		□42mm
	Motor Length + Brake Length	97.8mm	117.1mm	90mm
Motor Model	Unit	PBM282FCE20	PBM284FCE20	PBM423FCE20
Type M Set Model No.		PBDM282-B	PBDM284-B	PBDM423-B
Related Amplifier Model No.		PB3D003M200		
Motor Model	Unit	PBM282DCA20	PBM284DCA20	PBM423DCA20
Type R Multi-axis Model No.		PB2D003R1U△		
MAX. Stall Torque	N·m	0.055	0.155	0.39
Rotor Inertia	$\times 10^{-4}$kg·m^2	0.0091	0.0171	0.056
Allowable Thrust Load	N	9.8		
Allowable Radial Load Note1	N	33		49
Motor Mass	kg	0.28	0.35	0.5
Electromagnetic Brake Operation Method		No excitation actuating type		
Electromagnetic Brake Power Voltage	V	DC24V±5%		
Electromagnetic Brake Excitation Current	A	0.15		0.08
Electromagnetic Brake Power Consumption	W	3.6		2
Electromagnetic Brake Friction Torque	N·m	0.049		0.3
Electromagnetic Brake Brake Engage Time	ms	20		20
Electromagnetic Brake Brake Release Time	ms	20		30
Motor Characteristics Chart	Type M	①	③	⑤
	Type R Multi-Axis	②	④	⑥

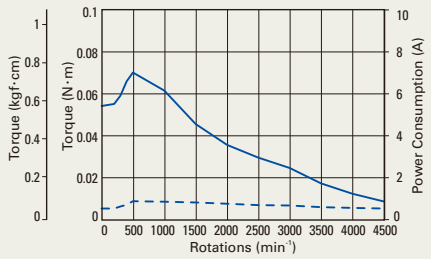
Motor Characteristics Chart

Type M Torque DC24V —— DC48V —— Power Consumption DC24V ---- DC48V ----

Type R Multi-Axis Torque DC24V —— DC36V ——

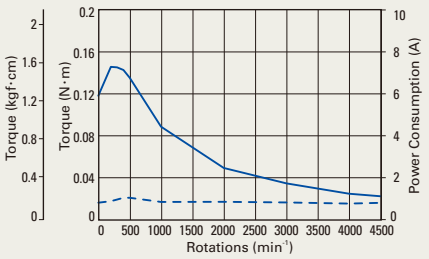
① Motor Model PBM282FCE20

Type M



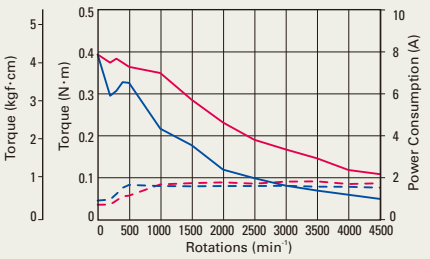
③ Motor Model PBM284FCE20

Type M



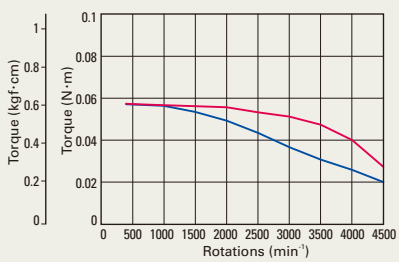
⑤ Motor Model PBM423FCE20

Type M



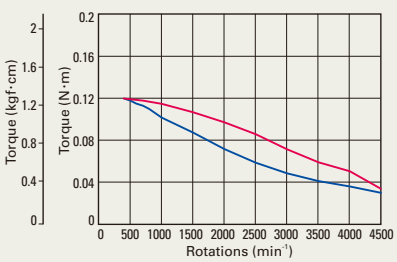
②Motor Model PBM282DCA20

Type R Multi-Axis



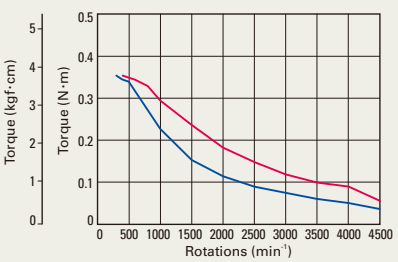
④ Motor Model PBM284DCA20

Type R Multi-Axis



⑥ Motor Model PBM423DCA20

Type R Multi-Axis



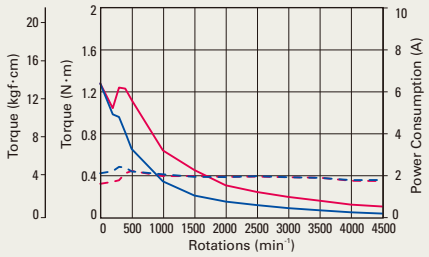
✻Maintain motor case temperature at a point below 85°C.

Note1: The load point is determined at a position 1/3 of the length from the output shaft.

□60mm	
113.6mm	145.6mm
PBM603FCE20	PBM604FCE20
PBDM603-B	PBDM604-B
PB3D003M200	
PBM603DCA20	PBM604DCA20
PB2D003R1U△	
1.3	1.9
0.4	0.84
14.7	
167	
1.19	1.76
No excitation actuating type	
DC24V±5%	
0.25	
6	
0.78	
20	
30	
⑦	⑨
⑧	⑩

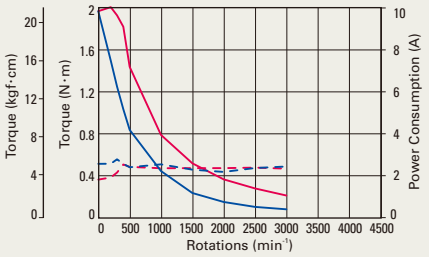
⑦ Motor Model PBM603FCE20

Type M



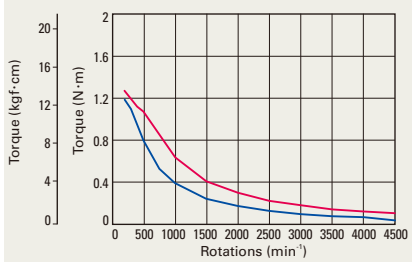
⑨ Motor Model PBM604FCE20

Type M



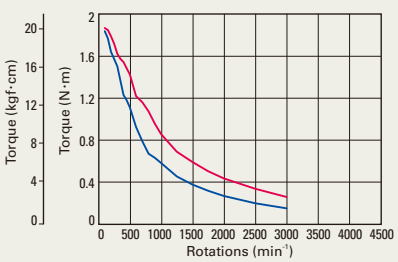
⑧ Motor Model PBM603DCA20

Type R Multi-Axis



⑩ Motor Model PBM604DCA20

Type R Multi-Axis



General Specifications

Spur Gear Model DC

Motor Flange Size

28

Size	Motor Flange Size	□28mm		
	Motor Length + Gear Length	88.5mm		
Motor Model	Unit	PBM282FGAE20	PBM282FGBE20	PBM282FGEE20
Type M Set Model No.		PBDM282-G3.6	PBDM282-G7.2	PBDM282-G10
Related Amplifier Model No.		PB3D003M200		
Motor Model	Unit	PBM282DGAA20	PBM282DGBA20	PBM282DGEA20
Type R Multi-axis Model No.		PB2D003R1U△		
MAX. Stall Torque	N·m	0.1	0.15	0.2
Rotor Inertia	$\times 10^{-4}$kg·m^2	0.017		
Reduction Gear Ratio		1:3.6	1:7.2	1:10
Backlash	DEG	2		
Allowable Rotations	min^{-1}	800	400	300
Rotation Direction	Rel. to command dir.	Forward		Reverse
Allowable Thrust Load	N	10		
Allowable Radial Load Note1	N	15		
Motor Mass	kg	0.22		
Motor Characteristics Chart	Type M	①	③	⑤
	Type R Multi-Axis	②	④	⑥

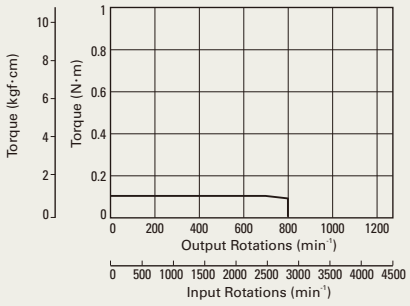
Motor Characteristics Chart

Type M Allowable Torque DC24V —— DC48V —— DC24V/48V ——

Type R Multi-Axis Allowable Torque DC24V —— DC36V —— DC24V/36V ——

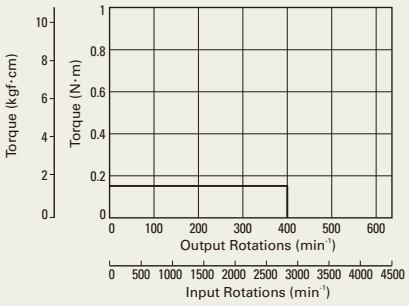
① Motor Model PBM282FGAE20

Type M



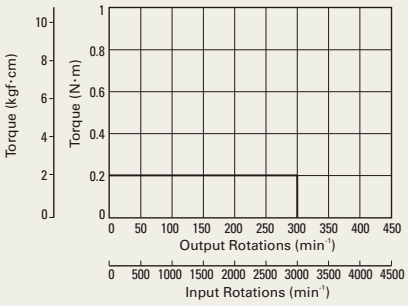
③ Motor Model PBM282FGBE20

Type M



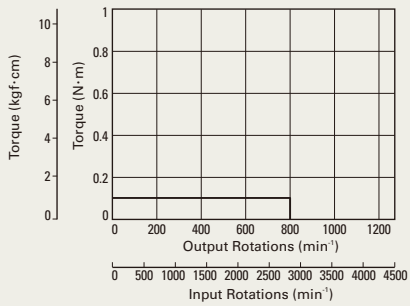
⑤ Motor Model PBM282FGEE20

Type M



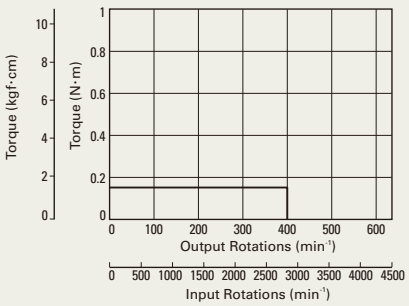
②Motor Model PBM282DGAA20

Type R Multi-Axis



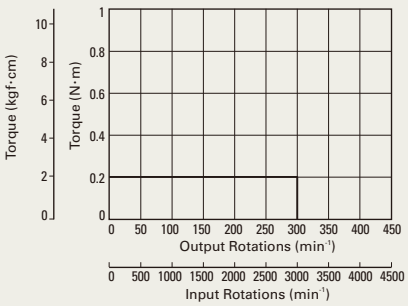
④ Motor Model PBM282DGBA20

Type R Multi-Axis



⑥ Motor Model PBM282DGEA20

Type R Multi-Axis



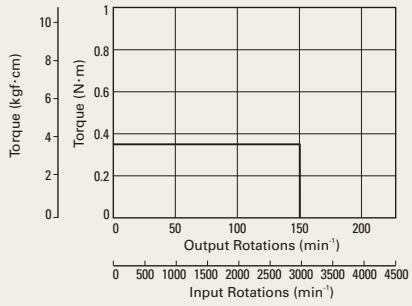
✻Maintain motor case temperature at a point below 85°C.

Note1: The load point is determined at a position 1/3 of the length from the output shaft.

□28mm		
88.5mm		
PBM282FGGE20	PBM282FGJE20	PBM282FGLE20
PBDM282-G20	PBDM282-G30	PBDM282-G50
PB3D003M200		
PBM282DGGA20	PBM282DGJA20	PBM282DGLA20
PB2D003R1U△		
0.35	0.5	
0.017		
1:20	1:30	1:50
1.5		
150	100	60
Forward		
10		
15		
0.22		
⑦	⑨	⑪
⑧	⑩	⑫

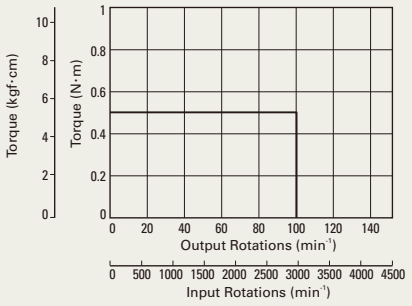
⑦ Motor Model PBM282FGGE20

Type M



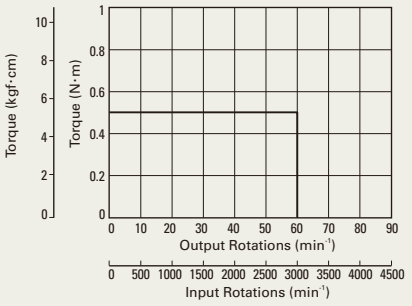
⑨ Motor Model PBM282FGJE20

Type M



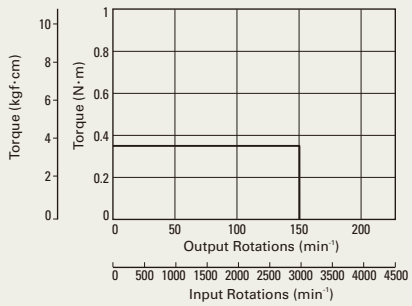
⑪ Motor Model PBM282FGLE20

Type M



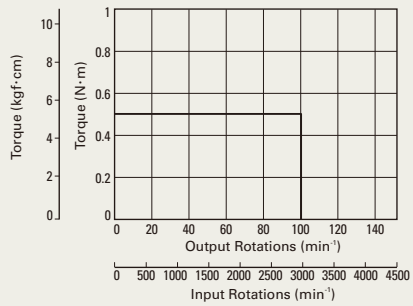
⑧ Motor Model PBM282DGGA20

Type R Multi-Axis



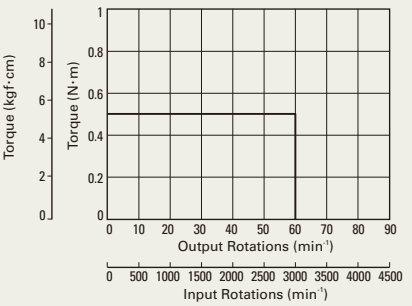
⑩ Motor Model PBM282DGJA20

Type R Multi-Axis



⑫ Motor Model PBM282DGLA20

Type R Multi-Axis

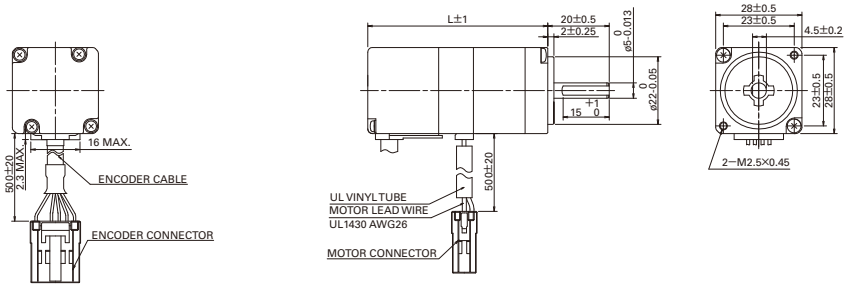


Motor Dimensional Drawings (Unit : mm)

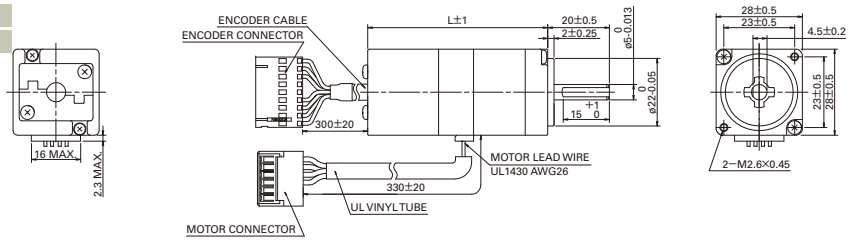
□ 28mm

● Standard Model

PBM282FXE20 DC
PBM284FXE20 DC



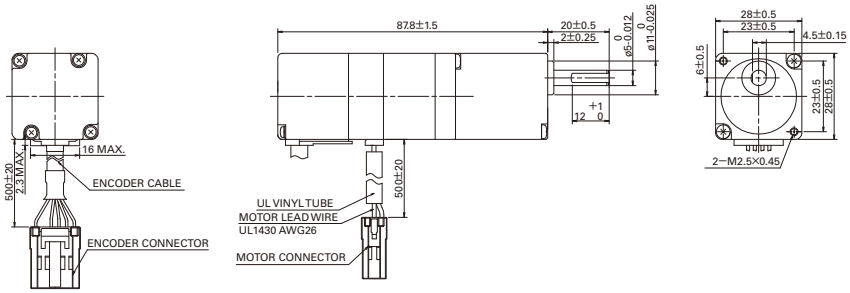
PBM282DXA20 DC Multi Axis
PBM284DXA20 DC Multi Axis



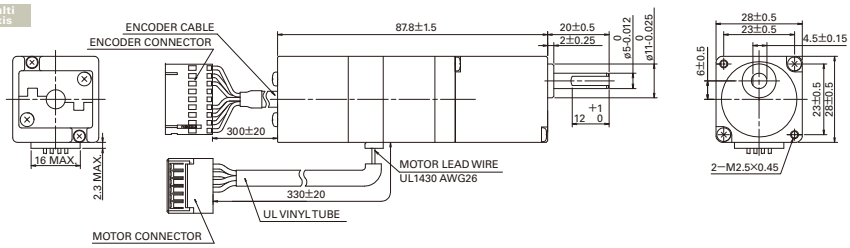
MODEL	L
PBM282	58.5
PBM284	77.8

● Spur Gear Model

PBM282FG□E20 DC

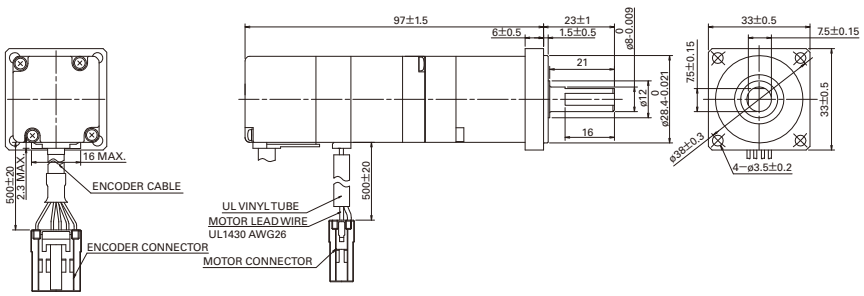


PBM282DG□A20 DC Multi Axis

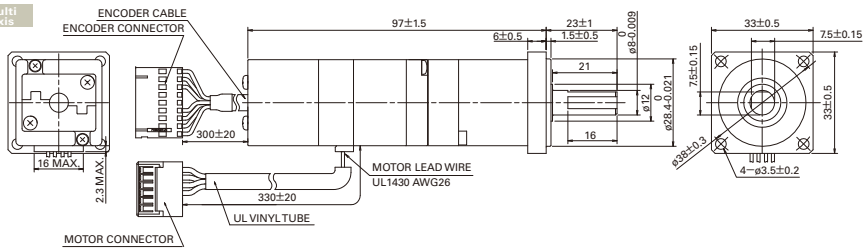


● Harmonic Gear Model

PBM282FH□E20 DC

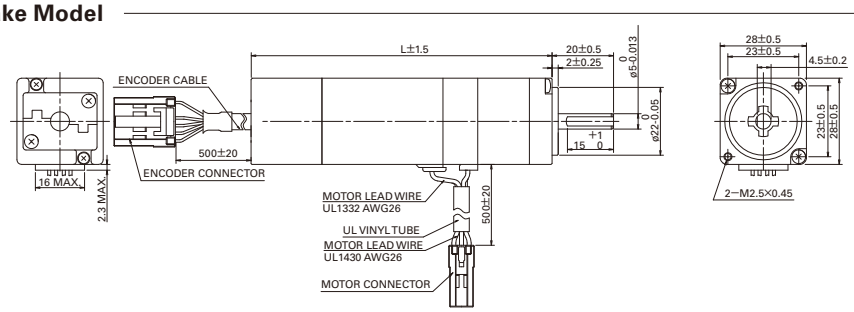


PBM282DH□A20 DC Multi Axis

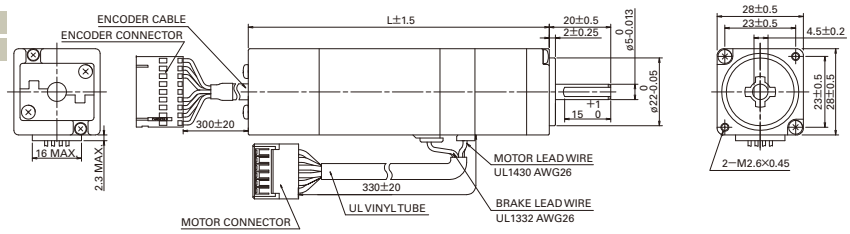


● Electromagnetic Brake Model

PBM282FCE20 DC
PBM284FCE20 DC



PBM282DCA20 DC Multi Axis
PBM284DCA20 DC Multi Axis

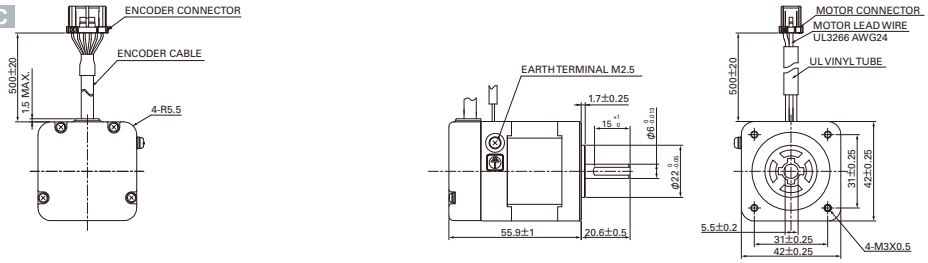


MODEL	L
PBM282	97.8
PBM284	117.1

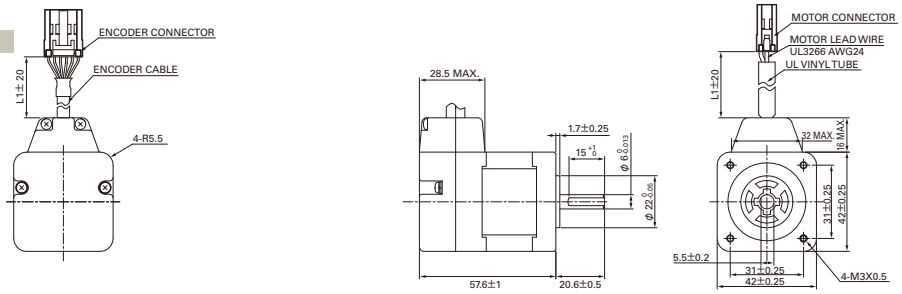
□ 42mm

● Standard Model

PBM423FXK20-M AC



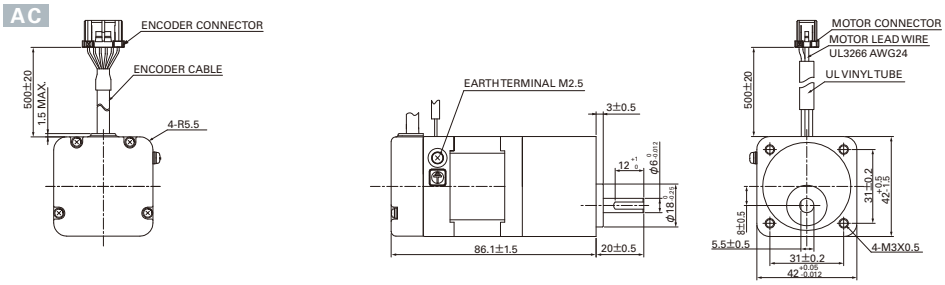
PBM423FXE20 DC
PBM423DXA20 DC Multi Axis



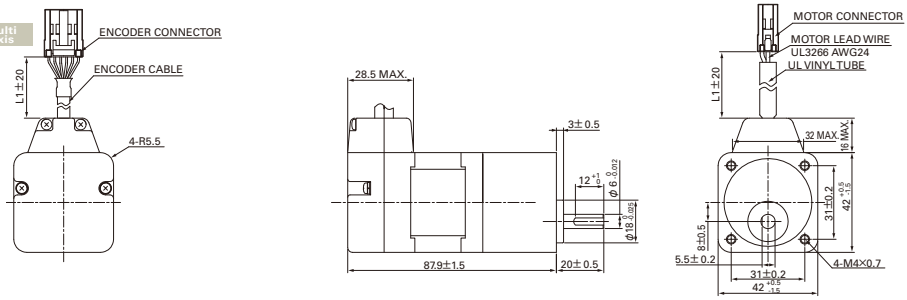
MODEL	L1
PBM423FXE20	500
PBM423DXA20	300

● Low-backlash Gear Model

PBM423FG□K20-M AC



PBM423FG□E20 DC
PBM423DG□A20 DC Multi Axis



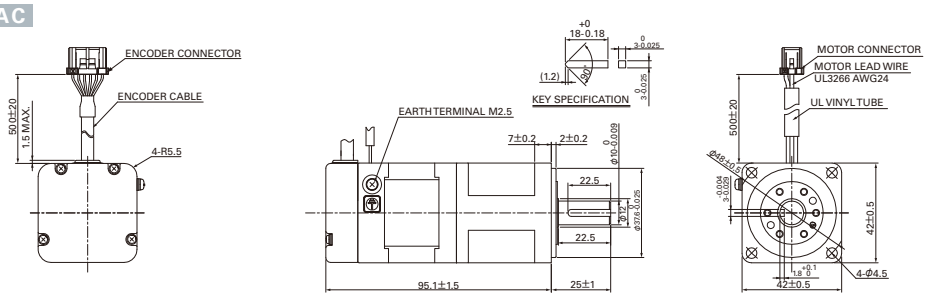
MODEL	L1
PBM423FG□E20	500
PBM423DG□A20	300

Motor Dimensional Drawings (Unit : mm)

□ 42mm

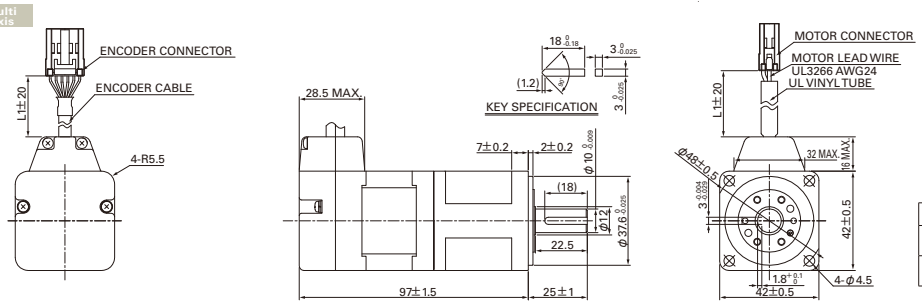
● Harmonic Gear Model

PBM423FH□K20-M AC



PBM423FH□E20 DC

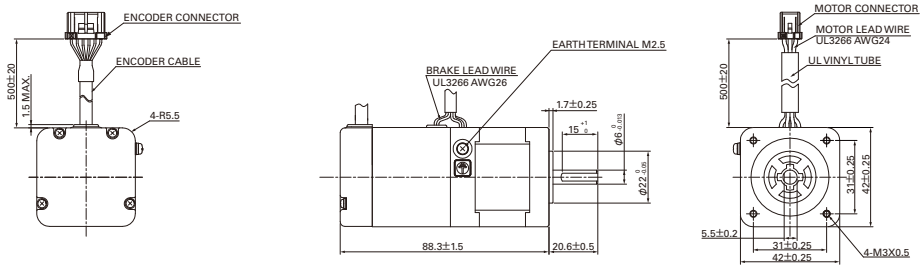
PBM423DH□A20 DC Multi Axis



MODEL	L1
PBM423FH□E20	500
PBM423DH□A20	300

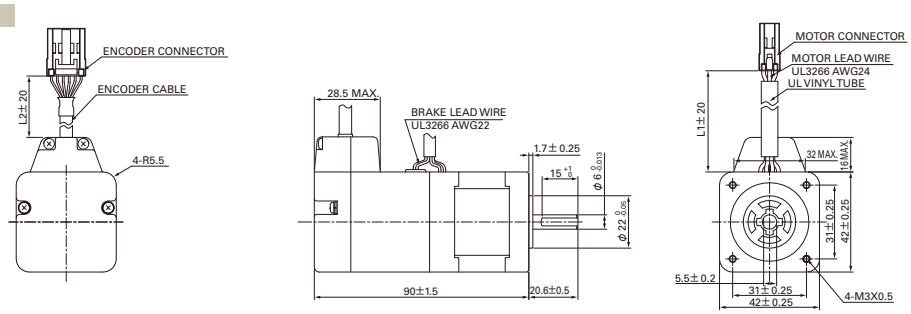
● Electromagnetic Brake Model

PBM423FCK20-M AC



PBM423FCE20 DC

PBM423DCA20 DC Multi Axis

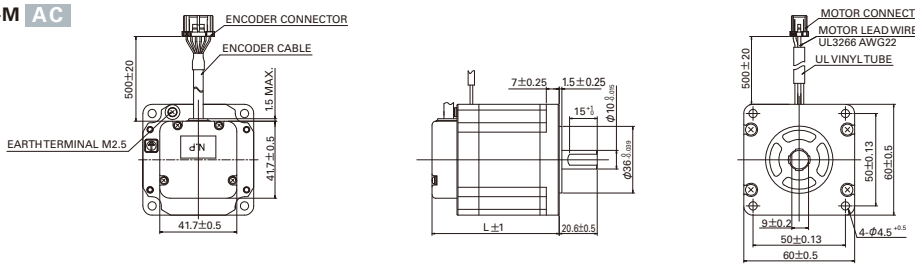


MODEL	L1	L2
PBM423FCE20	515	500
PBM423DCA20	315	300

□ 60mm

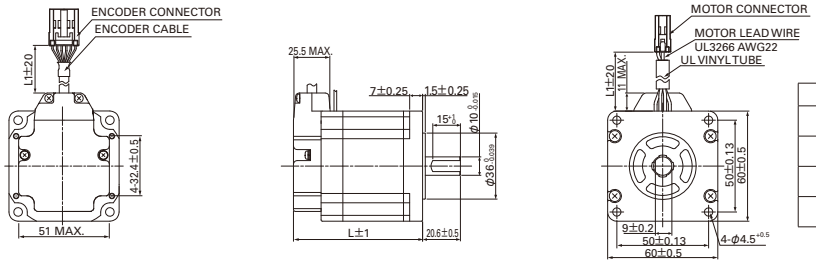
● Standard Model

PBM603FXK20-M AC
PBM604FXK20-M AC



MODEL	L
PBM603FXK20-M	68.8
PBM604FXK20-M	100.8

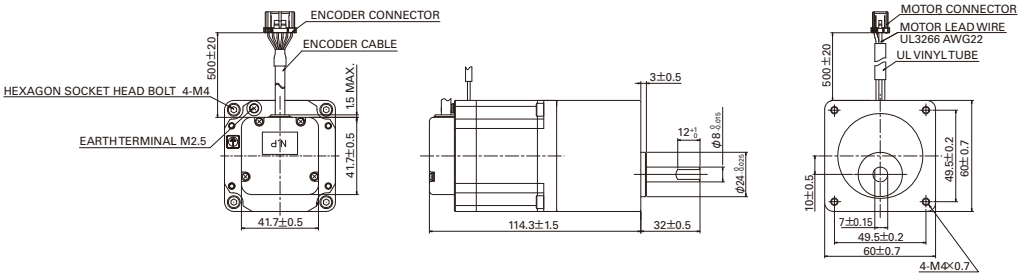
PBM603FXE20 DC
PBM604FXE20 DC
PBM603DXA20 DC Multi Axis
PBM604DXA20 DC Multi Axis



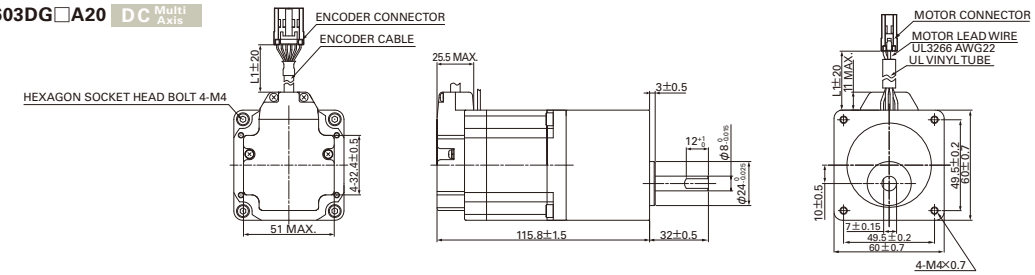
MODEL	L	L1
PBM603FXE20	70.3	500
PBM604FXE20	102.3	500
PBM603DXA20	70.3	300
PBM604DXA20	102.3	300

● Low-backlash Gear Model

PBM603FG□K20-M AC



PBM603FG□E20 DC
PBM603DG□A20 DC Multi Axis



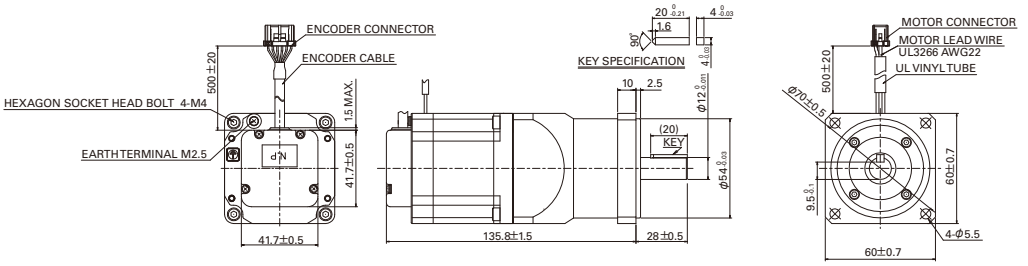
MODEL	L1
PBM603FG□E20	500
PBM603DG□A20	300

Motor Dimensional Drawings (Unit : mm)

□ 60mm

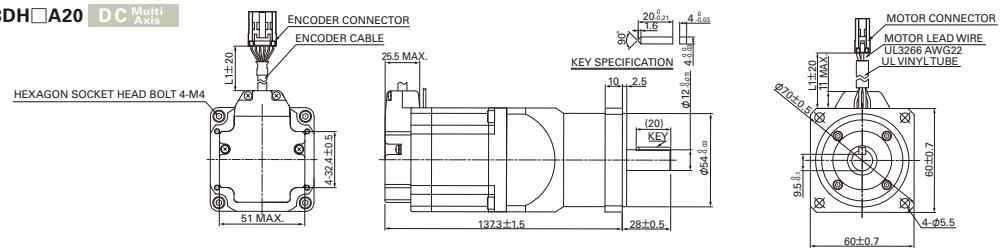
● Harmonic Gear Model

PBM603FH□K20-M AC



PBM603FH□E20 DC

PBM603DH□A20 DC Multi Axis

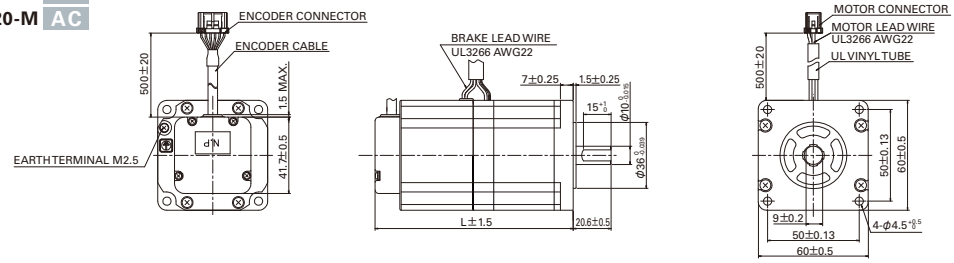


MODEL	L1
PBM603FH□E20	500
PBM603DH□A20	300

● Electromagnetic Brake Model

PBM603FCK20-M AC

PBM604FCK20-M AC



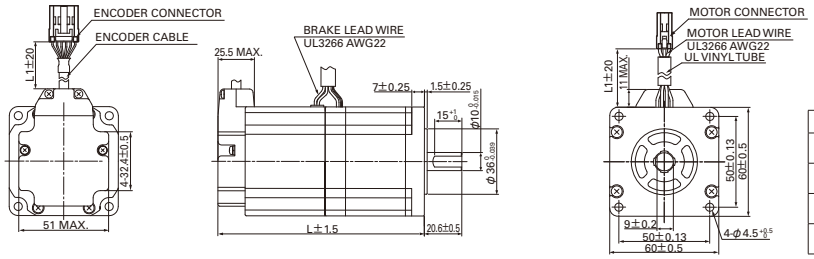
MODEL	L
PBM603FCK20-M	108.1
PBM604FCK20-M	140.1

PBM603FCE20 DC

PBM604FCE20 DC

PBM603DCA20 DC Multi Axis

PBM604DCA20 DC Multi Axis



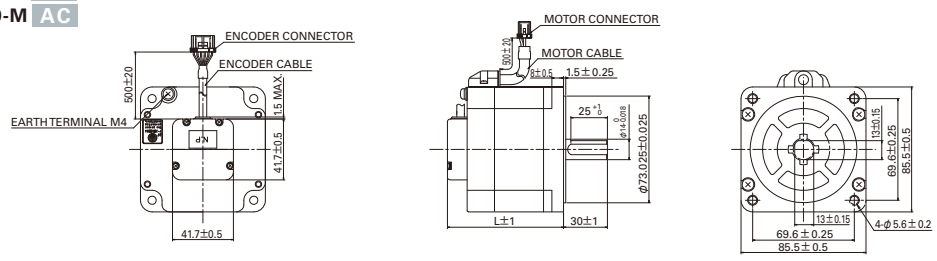
MODEL	L	L1
PBM603FCE20	113.6	500
PBM604FCE20	145.6	500
PBM603DCA20	113.6	300
PBM604DCA20	145.6	300

□ 86mm

● Standard Model

PBM861FXK20-M AC

PBM862FXK20-M AC



MODEL	L
PBM861FXK20-M	79.5
PBM862FXK20-M	110

❑ Connector Specification Of Motor Side

AC

Encoder Connector

Housing: 1827864-6
Terminal: 1827569-2
Manufacturer: AMP

Motor Connector

Housing: 1827864-3
Terminal: 1827570-2
Manufacturer: AMP

DC

Encoder Connector

Housing: 1-1318118-6
Terminal: 1318106-1
Manufacturer: AMP

Motor Connector

Housing: 1-1318119-3
Terminal: 1318105-1
Manufacturer: AMP

Connector Connection Of Encoder Side

PIN No.	LEAD COLR	
A1	Blue	CHANNEL A
B1	Brown	CHANNEL $\overline{A}$
A2	Green	CHANNEL B
B2	Purple	CHANNEL $\overline{B}$
A3	White	CHANNEL C
B3	Yellow	CHANNEL $\overline{C}$
A4	Red	+5V
B4	Black	0V
A5	N.C.	–
B5	Orange	OVER HEAT
A6	Black	Shield
B6	N.C.	–

Encoder Cable: UL20276

Connector Connection Of Motor Side

Standard Model, Low Backlash Gear Model, Harmonic Gear Model

PIN No.	LEAD COLR	
A1	Blue	Motor Lead Wire
B1	Orange	Motor Lead Wire
A2	Red	Motor Lead Wire
B2	Yellow	Motor Lead Wire
A3	N.C.	–
B3	N.C.	–

Electromagnetic Brake Model

PIN No.	LEAD COLR	
A1	Blue	Motor Lead Wire
B1	Orange	Motor Lead Wire
A2	Red	Motor Lead Wire
B2	Yellow	Motor Lead Wire
A3	Brake +	Brake Lead Wire
B3	Brake –	Brake Lead Wire

DC Multi-axis

Encoder Connector

Housing: 51030-0930
Terminal: 50083-8070
Manufacturer: MOLEX

Motor Connector

Housing: 5111-0610
Terminal: 50397-8000
Manufacturer: MOLEX

Connector Connection Of Encoder Side

2 Channel

PIN No.	LEAD COLR	
1	Blue	CHANNEL A
2	Brown	CHANNEL $\overline{A}$
3	Green	CHANNEL B
4	Purple	CHANNEL $\overline{B}$
5	N.C.	–
6	N.C.	–
7	Red	+5V
8	Black	0V
9	Black	FG (Shield)

Encoder Cable: UL20121

(3 Channel)

PIN No.	LEAD COLR	
1	Blue	CHANNEL A
2	Brown	CHANNEL $\overline{A}$
3	Green	CHANNEL B
4	Purple	CHANNEL $\overline{B}$
5	White	CHANNEL C
6	Yellow	CHANNEL $\overline{C}$
7	Red	+5V
8	Black	0V
9	Black	FG (Shield)

Encoder Cable: UL20276

Connector Connection Of Motor Side

Standard Model, Low Backlash Gear Model, Harmonic Gear Model

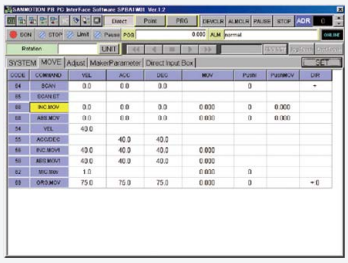
PIN No.	LEAD COLR	
1	Blue	Motor Lead Wire
2	Orange	Motor Lead Wire
3	Red	Motor Lead Wire
4	Yellow	Motor Lead Wire
5	N.C.	–
6	N.C.	–

Electromagnetic Brake Model

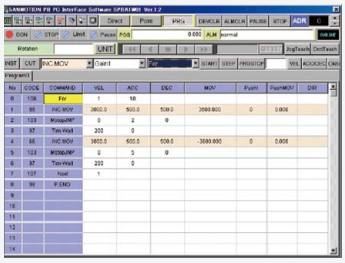
PIN No.	LEAD COLR	
1	Blue	Motor Lead Wire
2	Orange	Motor Lead Wire
3	Red	Motor Lead Wire
4	Yellow	Motor Lead Wire
5	Brake +	Brake Lead Wire
6	Brake –	Brake Lead Wire

PC Interface Description

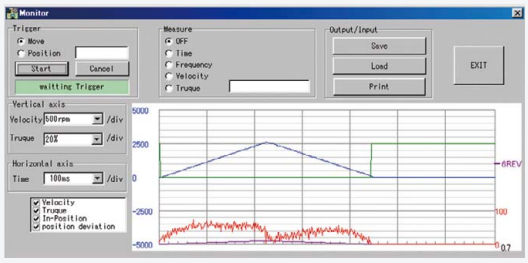
PC Interface Description



1: Parameter Input Screen



2: Point/Program Input Screen



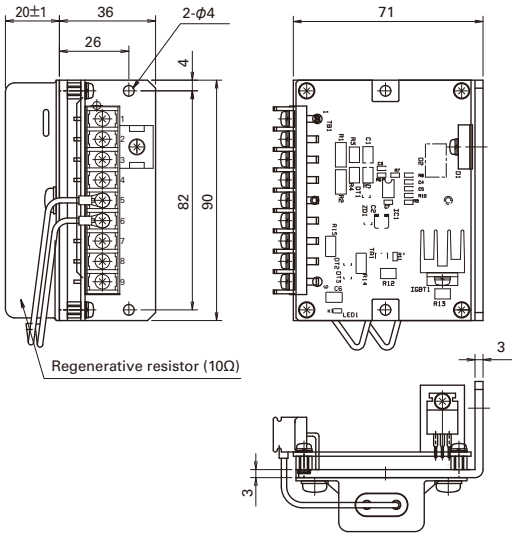
3: Operating Waveform Monitor (✻SPBALL-01 and SPBA1W-01 Support)

PB-R PC Interface Software Functions

■ Functions
- Direct command capability
- Point data editing/execution
- Program data editing/execution
- Current position/Alarm/Amplifier status monitoring
- Operating waveform monitor
- Off-line Editing
- Teaching Function, etc

■ Program Functions
- Various branching conditions (Position, Input Port, ZONE, Direct, Motor Stop)
- Timer Wait
- Subroutine Structure
- Loop Counter, etc.

Regenerative Unit (For Type R Multi-axis) Unit: mm
Model: PBFE-01



Note 1 : TB1-Connector block wiring screw M3
Tightening torque 0.6 N·m
Note 2 : The external regenerative resistor is mounted on the rear surface

Inquiry Check Sheet

For more information regarding any products or services described here in, please contact your nearest office listed on the back of this catalog.

To SANYO DENKI Co.,LTD.　　Date：

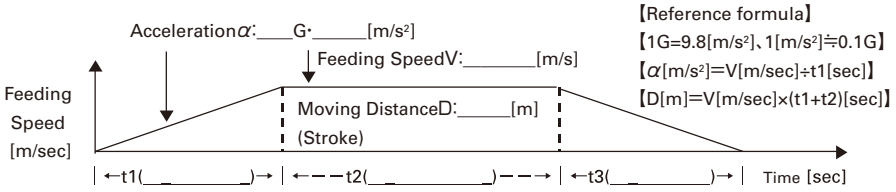
Company:

Department:

Name:

Tel:　　FAX:

E-mail:

	Item	Contents
❶	Name of target equipment	Equipment name, category (transport, processing, test, other)
❷	Name of servo axis	Axis name, axial mechanism (horizontal/vertical), brake mechanism (yes/no)
❸	Current condition of above axis	Manufacturer Name (　) Series Name (　) Motor Capacity (　) Hydraulic, Mechanical, or New System (　)
❹	Positioning accuracy	±　mm·±　μm
❺	Operation pattern	
❻	Mechanism	Ball-screw/screw-rotation type (horizontal), ball-screw/nut-rotation type (horizontal), rack and pinion (horizontal), belt/chain (horizontal), rotary table, roll feed, instability
❼	Mechanical structure	WT(table mass) kg　WL(work mass) kg　WA(mass of other drive parts) kg WR(rack mass) kg　WB(belt/chain mass) kg　WC(counterbalance mass) kg Fa(external force axial direction) N　Fb(ball-screw preload) N　T(roll pushing force) N Dr1(drive-side roll diameter) mm　Dr2(follower-side roll diameter) mm Lr1(drive-side roll length) mm　Lr2(follower-side roll length) mm　G(reduction ratio) JG(speed-reducer inertia) kg·m²　JC(coupling inertia) kg·m² JN(nut inertia) kg·m²　JO(other motor-axis conversion inertia) kg·m² Db(ball-screw diameter) mm　Lb(ball-screw axial length) mm　Pb(ball -screw lead) mm Dp(pinion/pulley diameter) mm　Lp(pinion axial length) mm　tp(pully thickness) mm Dt(table diameter) mm　Dh(table-support dianeter) mm　LW(load shift from axis) mm Ds(table shaft diameter) mm　Ls(table shaft length) mm ρ(specific gravity of ball-screw/pinion/pulley/table-shaft material) kg·cm³ μ(friction coefficient between sheet and shiliding-surface/support-section/roll)　ρ1(specific gravity of roll-1 material) kg／cm³ ρ2(specific gravity of roll-2 material) kg／cm³　κ(internal friction coefficient of preload nut) η(mechanical efficiency)　JL(load inertia of motor-axis conversion) kg·m² TF(friction torque of motor axis conversion) N·m　Tu(imbalance torque of motor axis conversion) N·m
❽	Speed reducer	Customer-provided (　／　)·Sanyo denki standard(planet/spur/no-backlash-planet　／　) other(　／　)
❾	Encoder type	Encoder type specified (yes / no) Yes:(incremental , optical absolute , optical absolute with incremental function, resolver absolute) Resolution(　)
❿	Input format	Position , velocity , torque , other (　)
⓫	Host equipment (controller)	Sequencer , laptop , customer-developed product , Sanyo dennki-provided , other (　)
⓬	Usage environment and other requirements	Cutting , clean-room use , anti-dust measures , other (　)
⓭	Estimated production	Single product: (　) units/mouth (　) units/year
⓮	Development schedule	Prototype period: (　)Year (　) Month Production period: (　)Year (　) Month
⓯	Various measures	Related documentation (already submitted; send later by mail) Visit/PR desired (yes / no) Meeting desired (yes / no)
⓰	Miscellaneous (questions, pending problems, unresolved issues, etc.)	

■ Precautions For Adoption

⚠ Cautions

Failure to follow the precautions on the right may cause moderate injury and property damage, or in some circumstances,could lead to a serious accident. Always follow all listed precautions.

⚠ Cautions

- Read the accompanying Instruction Manual carefully prior to using the product.
- If applying to medical devices and other equipment affecting people's lives, please contact us beforehand and take appropriate safety measures.
- If applying to equipment that can have significant effects on society and the general public, please contact us beforehand.
- Do not use this product in an environment where vibration is present, such as in a moving vehicle or shipping vessel.
- Do not perform any retrofitting, re-engineering, or modification to this equipment.
- The amplifiers presented in this catalog are meant to be used for general industrial applications. If using for special applications related to aviation and space, nuclear power, electric power, submarine repeaters, etc., please contact us beforehand.

*For any question or inquiry regarding the above, contact our Sales Department.

http://www.sanyodenki.co.jp

SANYO DENKI CO., LTD.
1-15-1, Kita-Otsuka, Toshima-ku, Tokyo 170-8451, Japan
Phone: +81 3 3917 5157

SANYO DENKI *AMERICA, INC.*
468 Amapola Avenue Torrance, CA 90501 U.S.A.
Phone: +1 310 783 5400

SANYO DENKI *EUROPE SA.*
P.A. Paris Nord II 48 Allee des Erables-VILLEPINTE BP.57286 F-95958 ROISSY CDG Cedex France
Phone: +33 1 48 63 26 61

SANYO DENKI *GERMANY GmbH*
Frankfurter Strasse 63-69 65760 Eschborn Germany
Phone: +49 6196 76113 0

SANYO DENKI *KOREA CO., LTD.*
9F 5-2, Sunwha-dong Jung-gu Seoul, 100-130, Korea
Phone: +82 2 773 5623

SANYO DENKI *SHANGHAI CO., LTD.*
Rm2108-2109, Bldg A, Far East International Plaza, No.319, Xianxia Rd., Shanghai, 200051, China
Phone: +86 21 6235 1107

SANYO DENKI *TAIWAN CO., LTD.*
Room 1208, 12F, No.96 Chung Shan N, Rd., Sec.2, Taipei 104, Taiwan, R.O.C.
Phone: +886 2 2511 3938

SANYO DENKI *(H.K.)CO., LIMITED*
Room 2305, 23/F, South Tower, Concordia Plaza, 1 Science Museum Rd., TST East, Kowloon, Hong Kong
Phone: +852 2312 6250

SANYO DENKI *SINGAPORE PTE. LTD.*
10 Hoe Chiang Road #14-03A/04 Keppel Towers Singapore 089315
Phone: +65 6223 1071

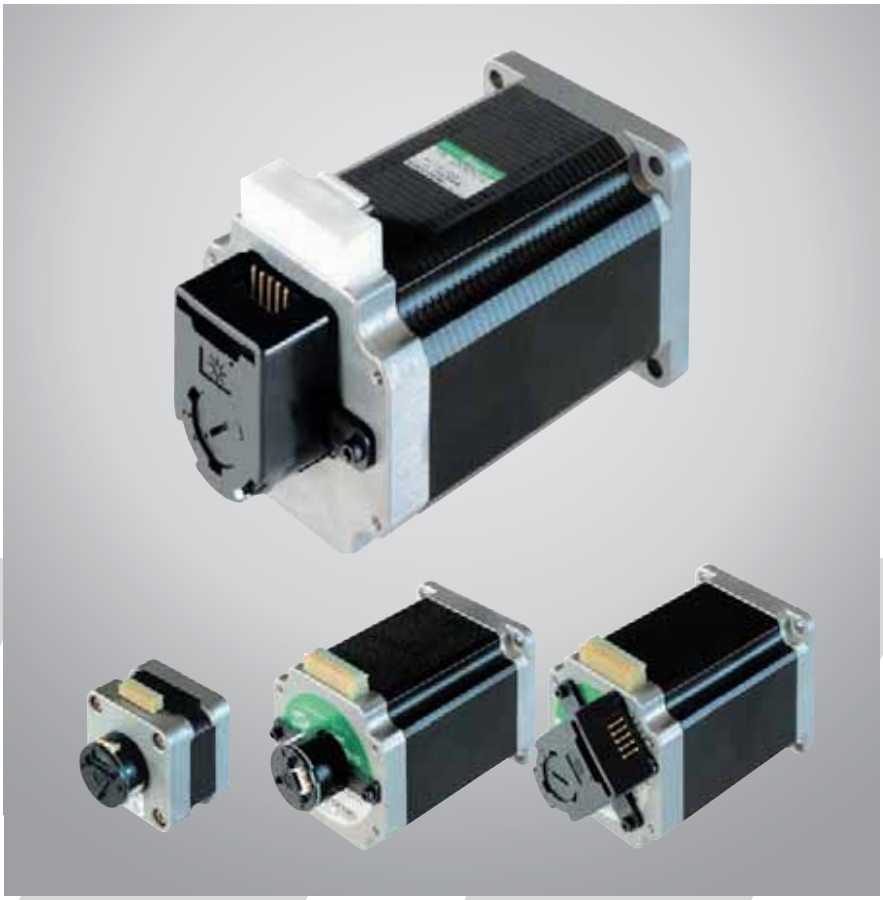
*Remarks : Specifications Are Subject To Change Without Notice.

CATALOG NO. 838-8 '09.12.IT

SANMOTION

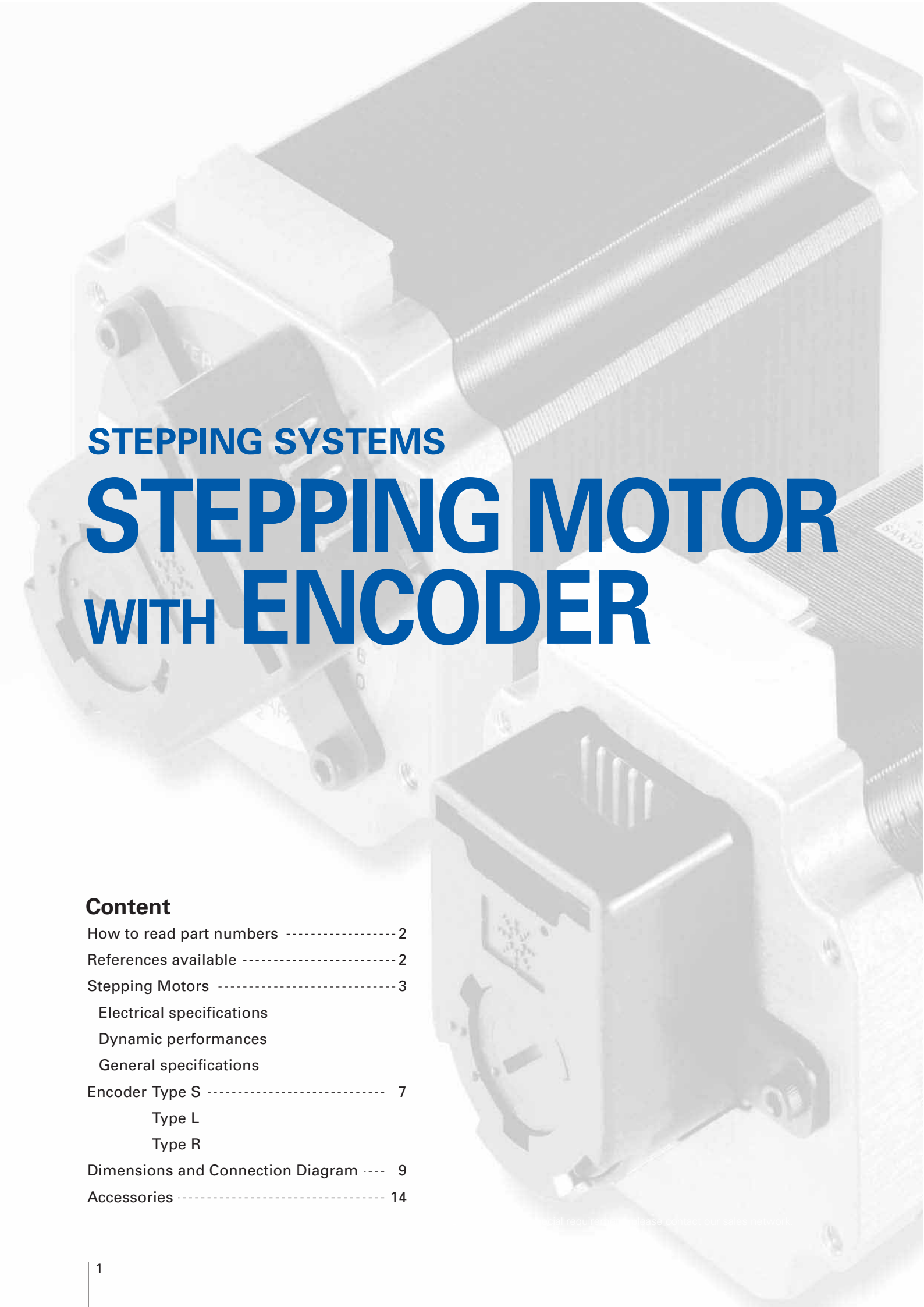
STEPPING SYSTEMS

STEPPING MOTOR WITH ENCODER



SANYO DENKI

English



STEPPING SYSTEMS

STEPPING MOTOR WITH ENCODER

Content

How to read part numbers ---------- 2
References available ---------- 2
Stepping Motors ---------- 3
- Electrical specifications
- Dynamic performances
- General specifications

Encoder Type S ---------- 7
- Type L
- Type R

Dimensions and Connection Diagram ---- 9
Accessories ---------- 14

How to read part numbers

2H 5654 B20 S 2 40 Φ

Motor Technology
2H : 2 phase High Torque
2P : 2 phase 400 steps/rev
5H : 5 phase High Torque

Motor dimension
5654 =
Flange 56x56mm Length 54mm

Current per phase
B20 = Bipolar 2.0A U12 = Unipolar 1.2A
P15 = 1.5A 5 leads (5-phase)

Encoder family
Type S, L or R

2 : 2 channels
3 : 3 channels

Encoder Resolution
20 : 200 CPR. 40 : 400 CPR.
50 : 500 CPR.

Options
Ø : standard A→Z : customized products

References available

On above table are introduced available combinations between stepping motors and encoders.

			ENCODER RESOLUTION					
			200 CPR	400 CPR			500 CPR	
			R220	S240	S340	L240	S250	S350
MOTOR FLANGE SIZE	42mm sq	2H4233B05	✓	○	✓		○	○
		2H4238B17	✓	○	✓		○	○
		2H4241B05		○	✓		○	○
		2H4241U12		○	✓		○	○
		2H4248U12	✓	○	✓		○	○
	56mm sq	2H5654U10	✓	○	✓	✓	○	○
		2H5654U20	○	○	✓	✓	○	○
		2H5654B20	○	○	✓	✓	○	○
		2H5676B20	○	○	✓	✓	○	○
	60mm sq	2H6086U20	○	○	○	○	✓	✓
		2H6086B40	○	○	○	○	✓	✓
		5H6086P15	○	○	○	○	✓	✓

✓ : Set motor + encoder standard.
○ : Set motor + encoder on demand.

Stepping Motors

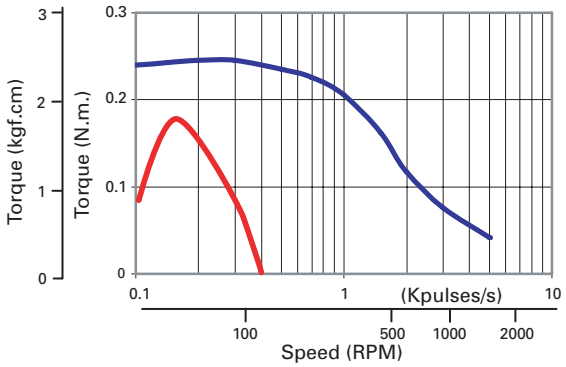
Hybrid
2-phase and 5-phase motors

Electrical specifications

P/N	Motor Base	Size mm	Step Angle °	Holding Torque N.m.	Winding type	Current per phase A	Resistance per phase Ω	Inductance mH	Rotor Inertia 10^{-4} kg • m²	Weight Kg	Encoder resolution CPR
2H4233B05	103H5205	42	1.8	0.26	Bipol	0.48	14	27	0.036	0.23	200, 400
2H4238B17	103H5208	42	1.8	0.39	Bipol	1.7	1.3	3.4	0.056	0.29	200, 400
2H4241B05	103H5209	42	1.8	0.42	Bipol	0.5	18	42	0.062	0.31	400
2H4241U12	103H5209	42	1.8	0.32	Unipol	1.2	3	3.9	0.062	0.31	400
2H4248U12	103H5210	42	1.8	0.37	Unipol	1.2	3.3	3.4	0.074	0.37	200, 400
2H5654U10	103H7123	56	1.8	0.83	Unipol	1	6.7	15	0.21	0.65	200, 400
2H5654U20	103H7123	56	1.8	0.83	Unipol	2	1.6	3.8	0.21	0.65	400
2H5654B20	103H7123	56	1.8	0.83	Bipol	2	0.8	3.8	0.21	0.65	400
2H5676B20	103H7126	56	1.8	1.27	Bipol	2	1.05	4.5	0.36	0.98	400
2H6086U20	103H7823	60	1.8	2.1	Unipol	2	2.7	5.6	0.84	1.34	500
2H6086B40	103H7823	60	1.8	2.7	Bipol	4	0.65	2.4	0.84	1.34	500
5H6086P15	103H7523	60	0.72	1.57	Penta	1.5	1.4	5.4	0.423	1.1	500

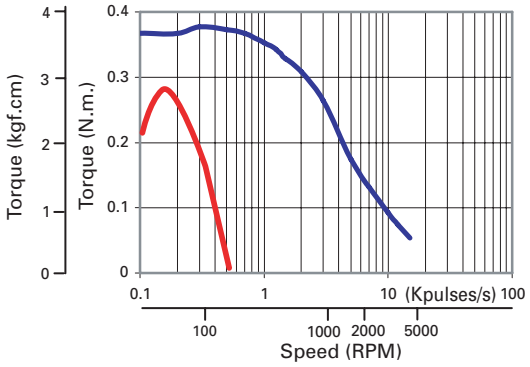
Dynamic performances

2H4233B05



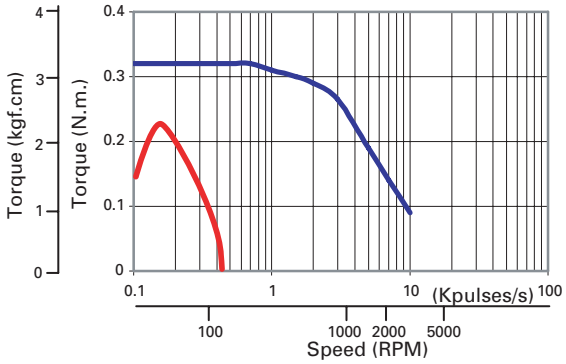
Driver : PMM-BD-4502
Power voltage : 36VDC
Current : 0.48A/phase bipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.8x10^{-4}$ kg.m^2]

2H4238B17



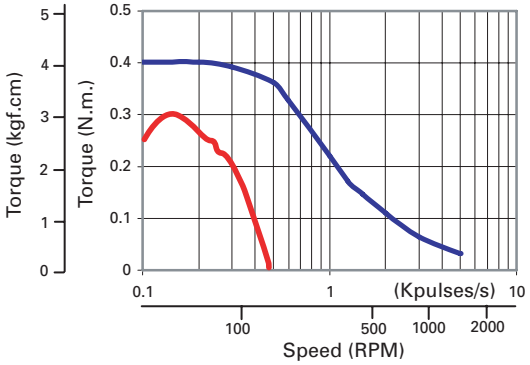
Driver : PMM-BD-4502
Power voltage : 36VDC
Current : 1.7A/phase bipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.8x10^{-4}$ kg.m^2]

2H4241U12



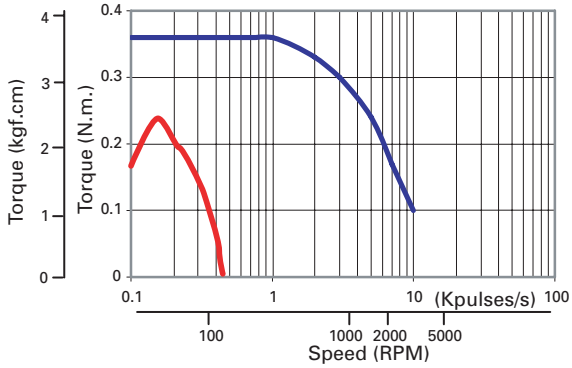
Driver : PMM-MD-23221-21
Power voltage : 36VDC
Current : 1.2A/phase unipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.8x10^{-4}$ kg.m^2]

2H4241B05



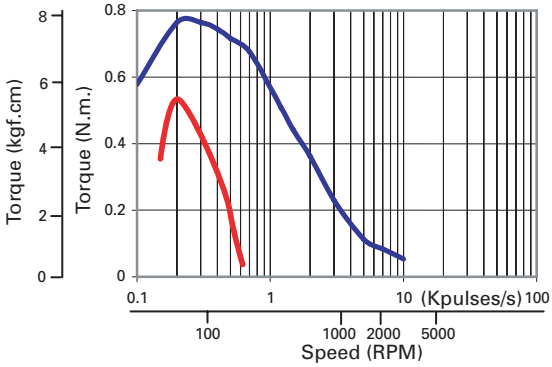
Driver : PMM-BD-4502
Power voltage : 36VDC
Current : 0.5A/phase bipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.21x10^{-4}$ kg.m^2]

2H4248U12



Driver : PMM-MD-23221-21
Power voltage : 36VDC
Current : 1.2A/phase
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.8x10^{-4}$ kg.m^2]

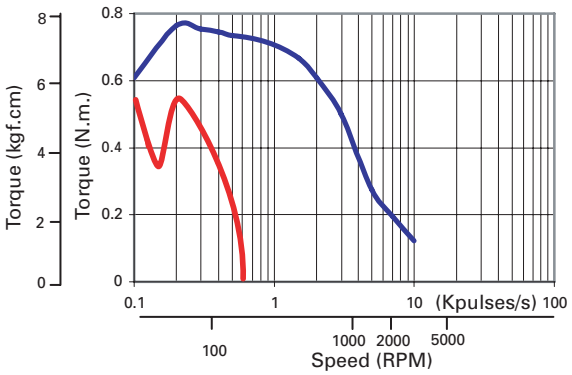
2H5654U10



Driver : PMM-MD-23221-10
Power voltage : 36VDC
Current : 1.0A/phase unipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.8x10^{-4}$ kg.m^2]

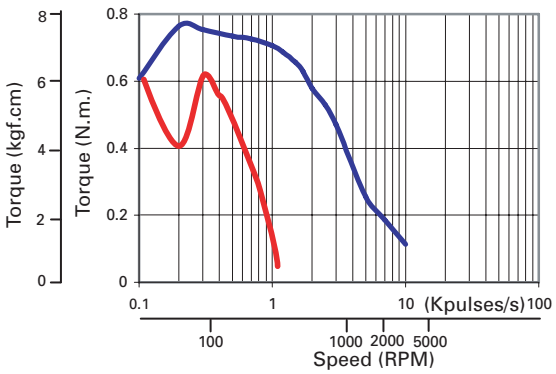
Dynamic performances

2H5654U20



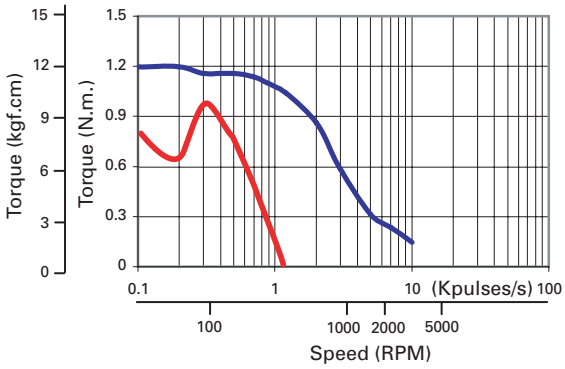
Driver : PMM-MD-23221-10
Power voltage : 36VDC
Current : 2.0A/phase unipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [JL1 = $0.8x10^{-4}$ kg.m^2]

2H5654B20



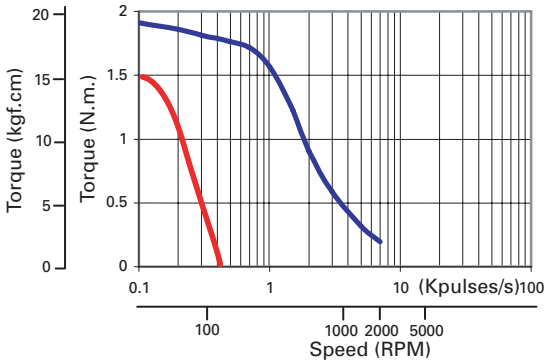
Driver : PMM-BD-4502
Power voltage : 36VDC
Current : 2.0A/phase bipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 0.94x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 0.21x10^{-4}$ kg.m^2]

2H5676B20



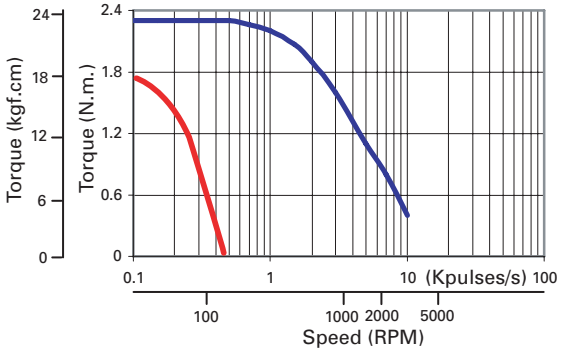
Driver : PMM-BD-4502
Power voltage : 36VDC
Current : 2.0A/phase bipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 2.6x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 2.6x10^{-4}$ kg.m^2]

2H6086U20



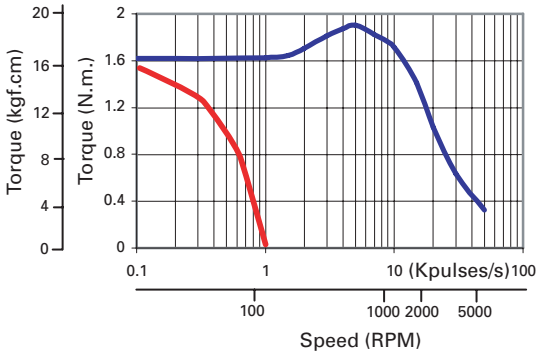
Driver : PMM-MD-23221-10
Power voltage : 36VDC
Current : 2.0A/phase unipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 7.4x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 7.4x10^{-4}$ kg.m^2]

2H6086B40



Driver : PMM-BA-4804
Power voltage : 100VAC
Current : 4.0A/phase bipolar
Excitation mode : Full step
- Pull-out torque [$J_{L2} = 7.4x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 7.4x10^{-4}$ kg.m^2]

5H6086P15

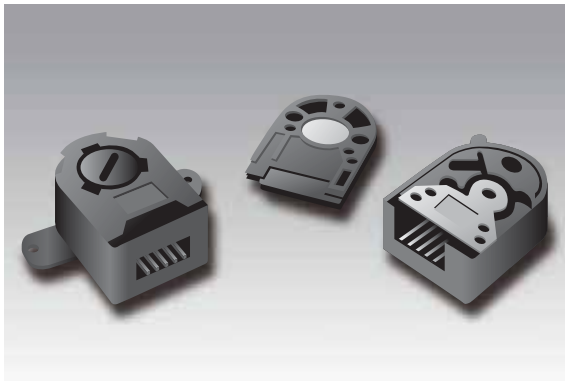


Driver : PMM-BA-5604
Power voltage : 36VDC
Current : 1,5A/phase
Excitation mode :
- Pull-out torque [$J_{L2} = 7.4x10^{-4}$ kg.m^2]
  Using rubber coupling
- Starting torque [$J_{L1} = 7.4x10^{-4}$ kg.m^2]

General specifications

	2H42□□	2H56□□	2H60□□	5H60□□
Insulation class	Classe B / 130℃			
Insulation resistance	100M or more when measured with a DC500V megohmeter between the motor wiring and the frame at normal temperature and humidity			
Withstand voltage	Not influenced when applied 1kVA (0.5kVA for 2H42), 50/60Hz between the motor wound wire and the frame for 1 minute (leak current 1mA) at room temperature and humidity			
Operating environment	Ambient temperature : -10℃ to +50℃			
	Ambient humidity : 20 to 90% (no condensation)			
Winding temperature rise	≤ 80 K			
Standing angle error	± 0.09°	±0.054°		± 0.09°
Axial play	≤ 0.075 mm (load 4.4 N)	≤ 0.75 mm (load 9 N)		
Radial play (1)	≤ 0.025 mm (load 4.4 N)			
Shaft run outs	0.025 mm			
Concentricity of mounting spigot relative to shaft	⌀ 0.05 mm	⌀ 0.075 mm		
Perpendicularity of mounting surface relative to shaft	0.1 mm	0.075 mm		
Allowable thrust load	10N	15N	20N	15N
Allowable radial load (1)	28N	75N	80N	115N

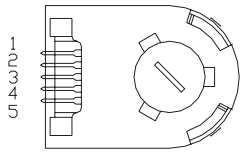
Note 1 : load point is the position 1/3 from the output shaft end.



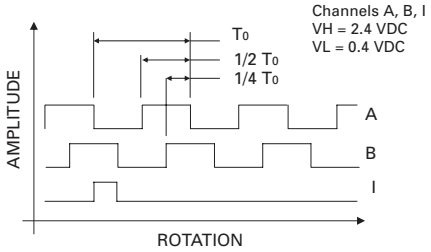
Encoder Type S

Optical incremental encoder TTL compatible
Operating Voltage : 4.5 to 5.5 VDC
Counts per Revolution : 400, 500
Max. Reply Frequency : 100 kHz

Diagram



Waveforms



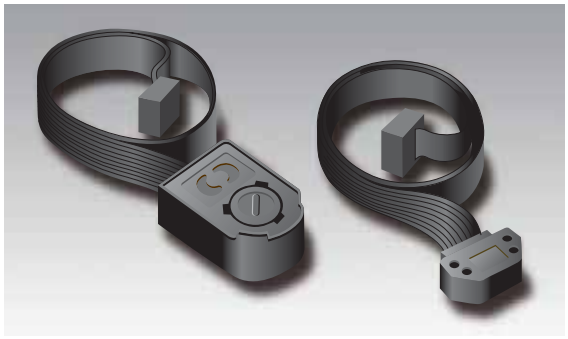
Connection

	2 Channel Encoder	3 Channel Encoder
Pin 1	GND	
Pin 2	NC	Channel I
Pin 3	Channel A	
Pin 4	5 VDC	
Pin 5	Channel B	

Suitable connector
Molex 2695-05, 2759
AMP 103686-4, 640442-5
BERG 65039-032, 4825X-000

Standard P/N

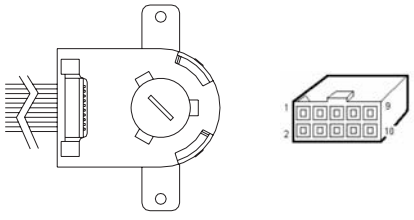
- ✓ S240 : 2 channels, 400 CPR
- ✓ S340 : 3 channels, 400 CPR
- ✓ S250 : 2 channels, 500 CPR
- ✓ S350 : 3 channels, 500 CPR



Encoder Type L

Optical incremental encoder Line Driver
Operating Voltage : 4.5 to 5.5VDC
Counts per Revolution : 400
Max. Reply Frequency : 100 kHz

Diagram

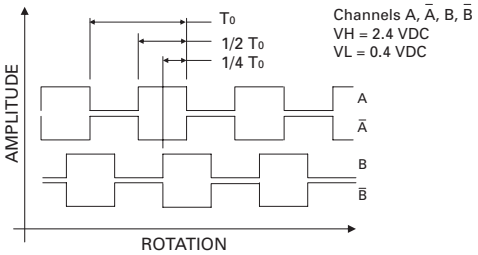


Connection

Pin 1	NC	Pin 6	A
Pin 2	+5 VDC	Pin 7	/B
Pin 3	GND	Pin 8	B
Pin 4	NC	Pin 9	NC
Pin 5	/A	Pin 10	NC

Leadwire output : 480mm - AWG28
Fitted with connector BERG HE10

Waveforms



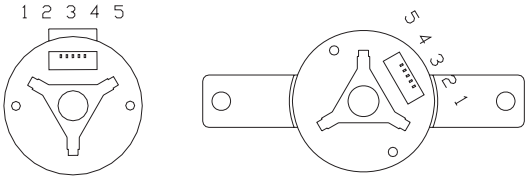
Standard P/N

- ✓ L240 : 2 channels, 400 CPR

Encoder Type R

Optical incremental encoder
Operating Voltage : 4.5 to 5.5 VDC
Counts per Revolution : 200
Max. Reply Frequency : 16 kHz

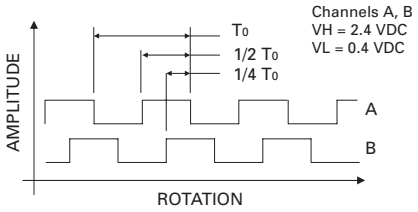
Diagram



Radial Output for 42mm flange motor

Axial Output for 56mm flange motor

Waveforms



Connection

Pin 1	GND
Pin 2	NC
Pin 3	Channel A
Pin 4	5 VDC
Pin 5	Channel B

Suitable connector Molex 51021-0500

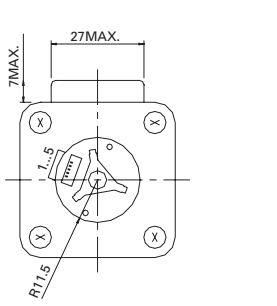
Standard P/N

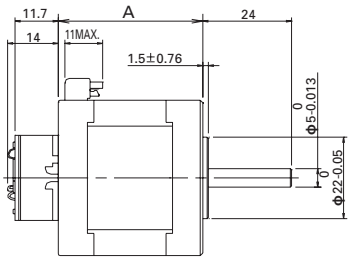
✓ R220 : 2 channels, 200 CPR

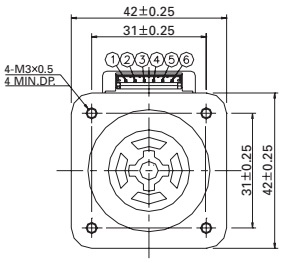
Dimensions and Connection Diagram

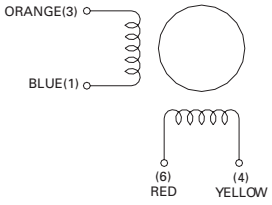
	R220	S240	S340	L240	S250	S350
2H4233B05	A1	A2	A2			
2H4238B17	A1	A2	A2			
2H4241B05		A2	A2			
2H4241U12		A3	A3			
2H4248U12	A4	A3	A3			
2H5654U10	B1	B2	B2	B3		
2H5654U20		B2	B2	B3		
2H5654B20		B4	B4	B5		
2H5676B20		B4	B4	B5		
2H6086U20					C1	C1
2H6086B40					C2	C2
5H6086P15					D1	D1

DIAGRAM A1







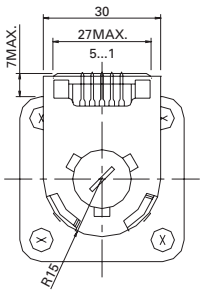


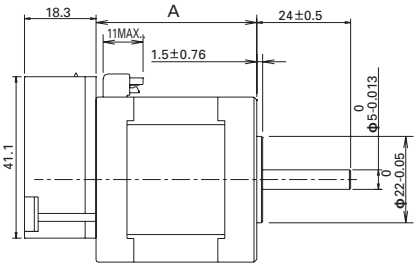
Encoder	R220
Pin 1	GND
Pin 2	NC
Pin 3	Ch A
Pin 4	5VDC
Pin 5	Ch B

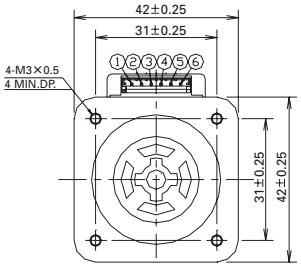
Motor Length	A (mm)
2H4233B05-	33
2H4238B17-	38

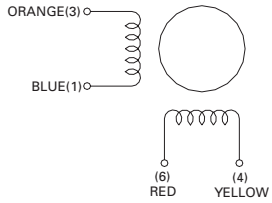
Unit : mm

DIAGRAM A2







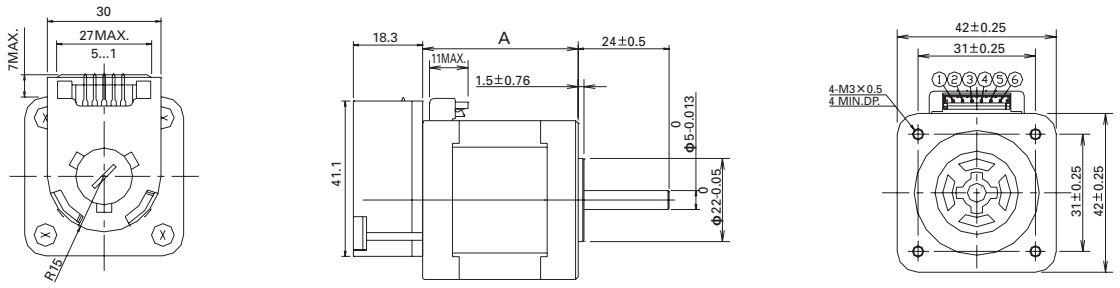


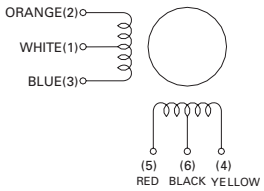
Encoder	S240	S340
Pin 1	GND	
Pin 2	NC	ChI
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

Motor Length	A (mm)
2H4233B05-	33
2H4238B17-	38
2H4241B05-	41

Unit : mm

DIAGRAM A3



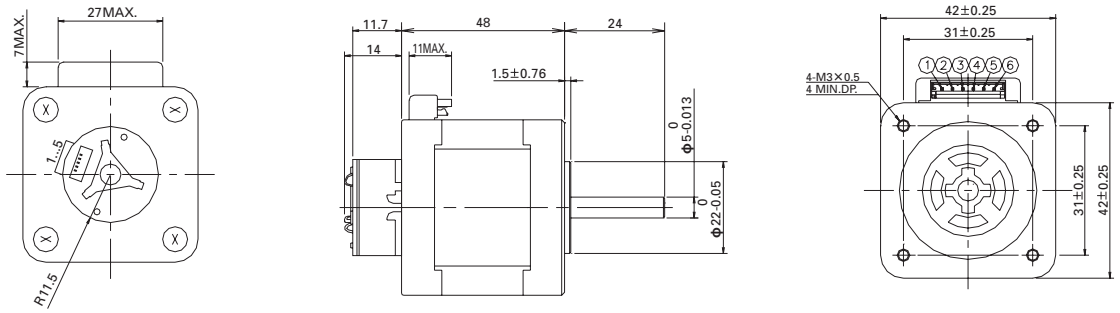


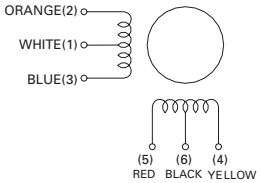
Encoder	S240	S340
Pin 1	GND	
Pin 2	NC	ChI
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

Motor Length	A (mm)
2H4241U12-	41
2H4248B12-	48

Unit : mm

DIAGRAM A4 – MOTOR 2H4248U12



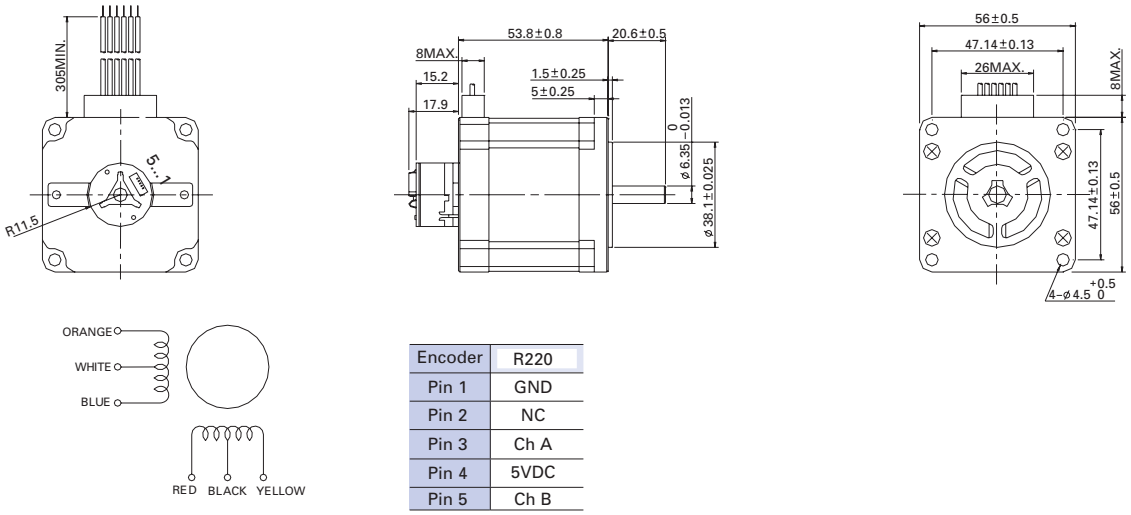


Encoder	R220
Pin 1	GND
Pin 2	NC
Pin 3	Ch A
Pin 4	5VDC
Pin 5	Ch B

Unit : mm

Dimensions and Connection Diagram

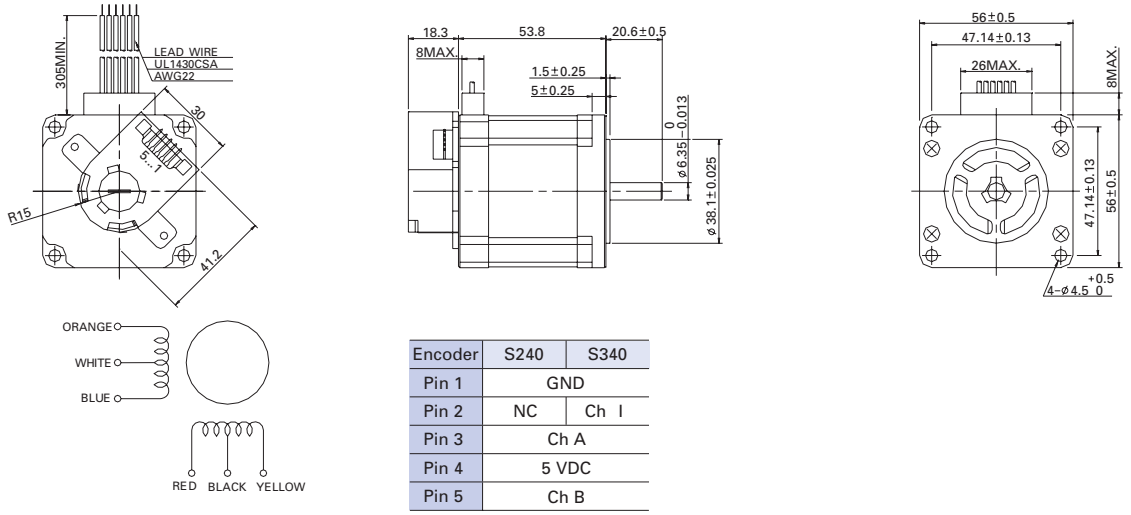
DIAGRAM B1 – MOTOR 2H5654U10



Encoder	R220
Pin 1	GND
Pin 2	NC
Pin 3	Ch A
Pin 4	5VDC
Pin 5	Ch B

Unit : mm

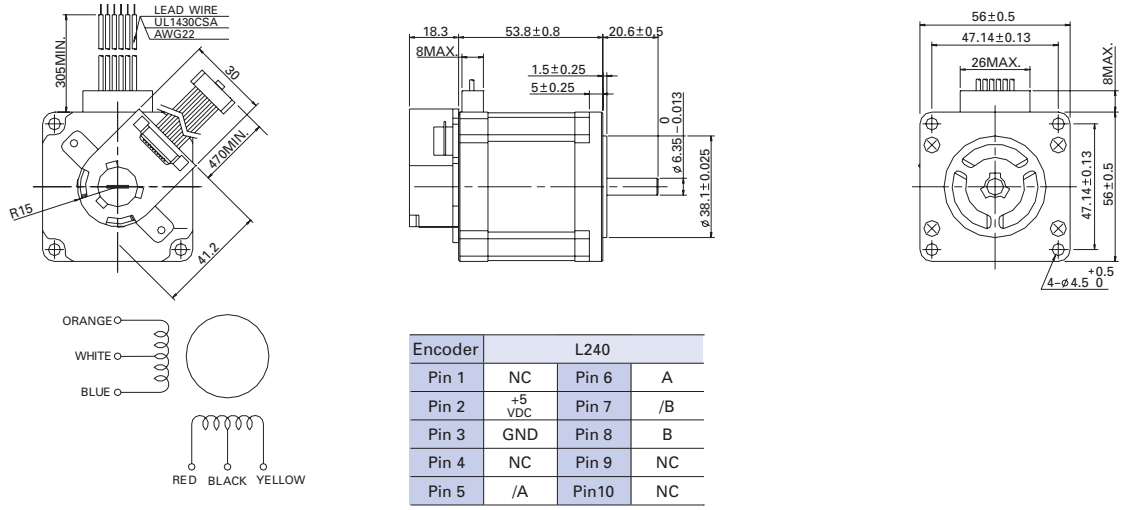
DIAGRAM B2 – MOTOR 2H5654U10 – 2H5654U20



Encoder	S240	S340
Pin 1	GND	
Pin 2	NC	Ch I
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

Unit : mm

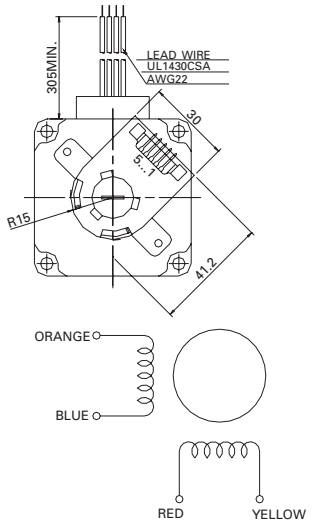
DIAGRAM B3 – MOTOR 2H5654U10 – 2H5654U20

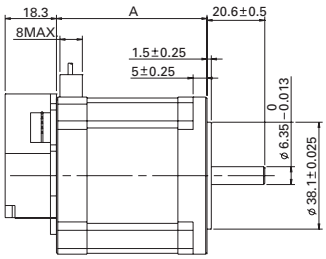


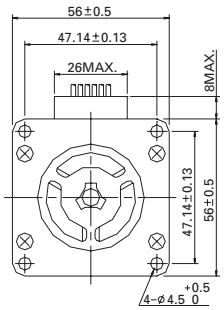
Encoder	L240		
Pin 1	NC	Pin 6	A
Pin 2	+5 VDC	Pin 7	/B
Pin 3	GND	Pin 8	B
Pin 4	NC	Pin 9	NC
Pin 5	/A	Pin10	NC

Unit : mm

DIAGRAM B4





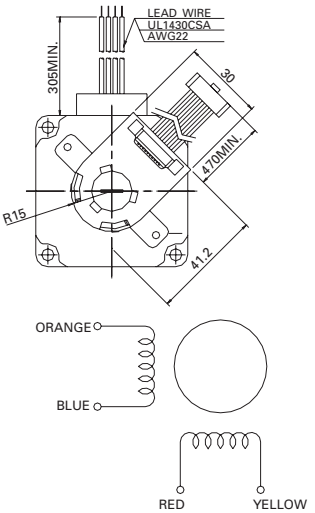


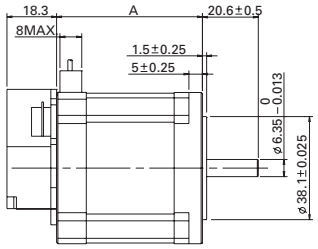
Encoder	S240	S340
Pin 1	GND	
Pin 2		Ch I
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

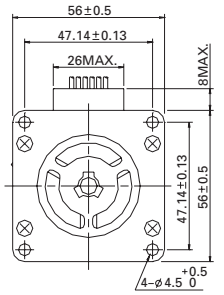
Motor length	A (mm)
2H5654B20-	53.8
2H5676B20-	76

Unit : mm

DIAGRAM B5







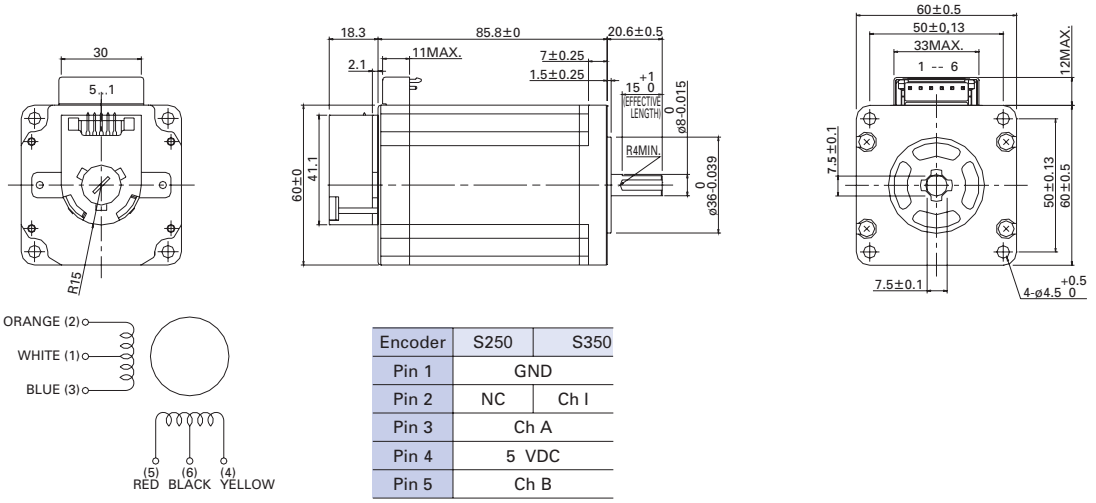
Encoder	L240		
Pin 1	NC	Pin 6	A
Pin 2	+5 VDC	Pin 7	/B
Pin 3	GND	Pin 8	B
Pin 4	NC	Pin 9	NC
Pin 5	/A	Pin 10	NC

Motor length	A (mm)
2H5654B20-	53.8
2H5676B20-	76

Unit : mm

Dimensions and Connection Diagram

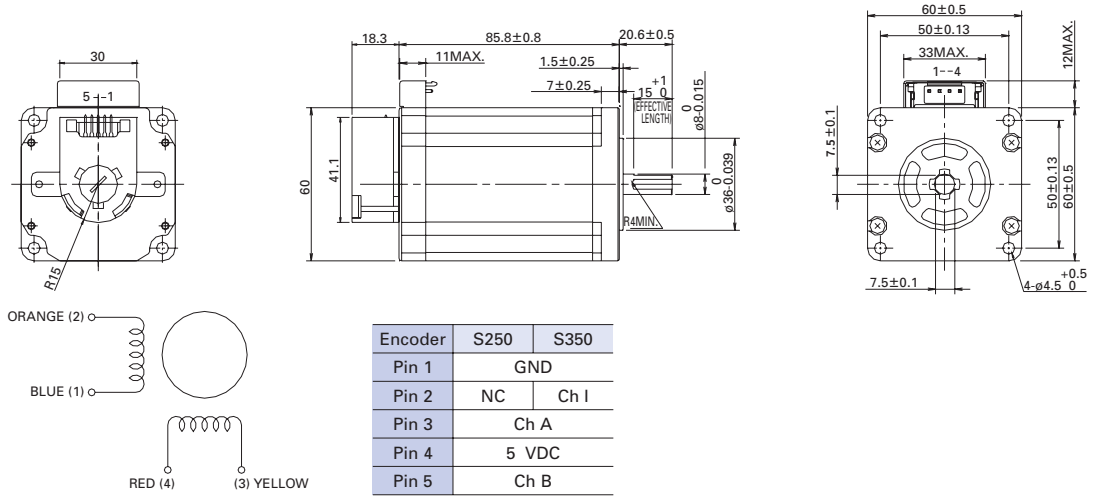
DIAGRAM C1 - MOTOR 2H6086U20



Encoder	S250	S350
Pin 1	GND	
Pin 2	NC	Ch I
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

Unit : mm

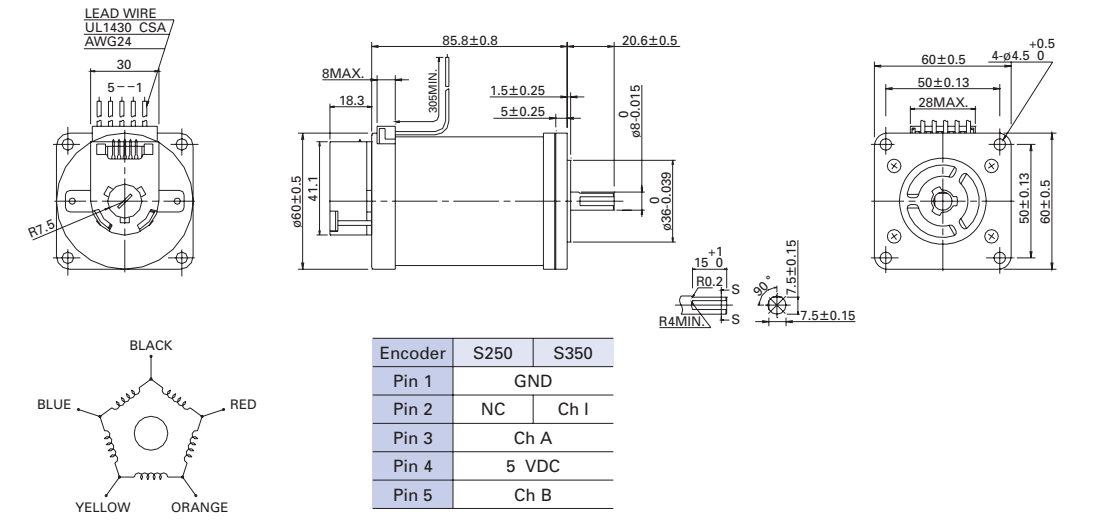
DIAGRAM C2 - MOTOR 2H6086B40



Encoder	S250	S350
Pin 1	GND	
Pin 2	NC	Ch I
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

Unit : mm

DIAGRAM D1 - MOTOR 5H6086P15

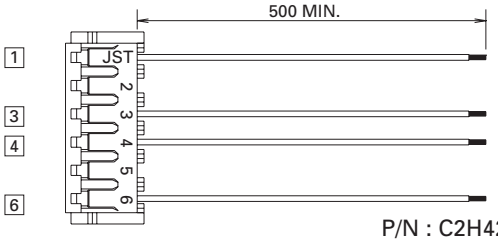


Encoder	S250	S350
Pin 1	GND	
Pin 2	NC	Ch I
Pin 3	Ch A	
Pin 4	5 VDC	
Pin 5	Ch B	

Unit : mm

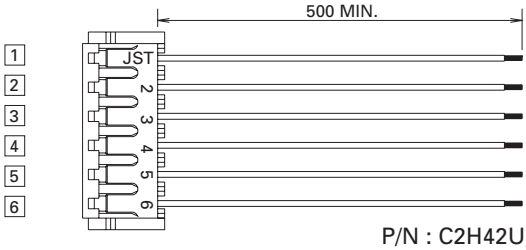
Accessories

Motor flange 42mm cable



P/N : C2H42B500

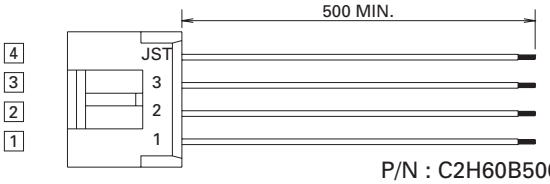
	Lead Color
Pin 1	BLUE
Pin 2	NC
Pin 3	ORANGE
Pin 4	YELLOW
Pin 5	NC
Pin 6	RED



P/N : C2H42U500

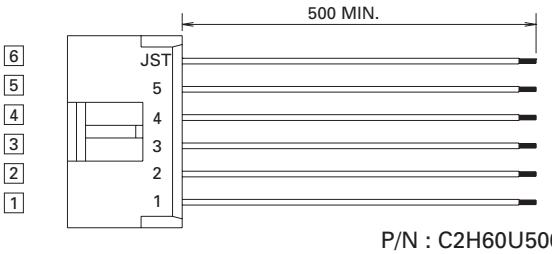
	Lead Color
Pin 1	WHITE
Pin 2	ORANGE
Pin 3	BLUE
Pin 4	YELLOW
Pin 5	RED
Pin 6	BLACK

Motor flange 60mm cable



P/N : C2H60B500

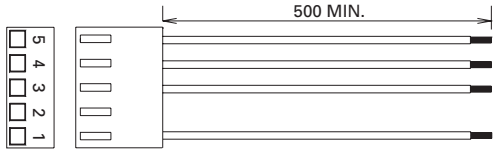
	Lead Color
Pin 1	BLUE
Pin 2	ORANGE
Pin 3	YELLOW
Pin 4	RED



P/N : C2H60U500

	Lead Color
Pin 1	WHITE
Pin 2	ORANGE
Pin 3	BLUE
Pin 4	YELLOW
Pin 5	RED
Pin 6	BLACK

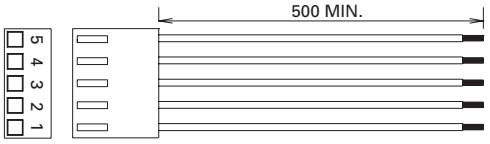
2 Channel Type S encoder cable



P/N : CS2500

	Lead Color
Pin 1	BLACK
Pin 2	NC
Pin 3	YELLOW
Pin 4	RED
Pin 5	GREEN

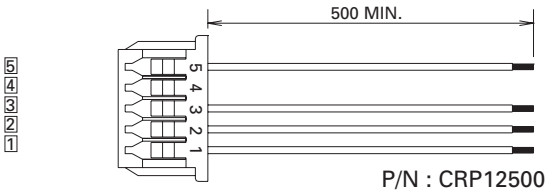
3 Channel Type S encoder cable



P/N : CS3500

	Lead Color
Pin 1	BLACK
Pin 2	WHITE
Pin 3	YELLOW
Pin 4	RED
Pin 5	GREEN

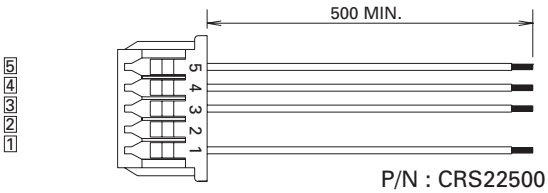
R220 encoder Cable for 2H42 motors



P/N : CRP12500

	Lead Color
Pin 1	GREEN
Pin 2	RED
Pin 3	YELLOW
Pin 4	NC
Pin 5	BLACK

R220 encoder Cable for 2H56 motors



P/N : CRS22500

	Lead Color
Pin 1	BLACK
Pin 2	NC
Pin 3	YELLOW
Pin 4	RED
Pin 5	GREEN

■ Precautions For Adoption

⚠ Cautions

Failure to follow the precautions on theright may cause moderate injury and property damage, or in some circumstances, could lead to a serious accident. Always follow all listed precautions.

⚠ Cautions

- Read the accompanying Instruction Manual carefully prior to using the product.
- If applying to medical devices and other equipment affecting people's lives, please contact us beforehand and take appropriate safety measures.
- If applying to equipment that can have significant effects on society and the general public, please contact us beforehand.
- Do not use this product in an environment where vibration is present, such as in a moving vehicle or shipping vessel.
- Do not perform any retrofitting, re-engineering, or modification to this equipment.
- The amplifiers presented in this catalog are meant to be used for general industrial applications. If using for special applications related to aviation and space, nuclear power, electric power, submarine repeaters, etc., please contact us beforehand.

＊For any question or inquiry regarding the above, contact our Sales Department.

SANYO DENKI *EUROPE SA.*
P.A. PARIS NORD II 48 Allée des Erables-VILLEPINTE BP.50286 F-95958 ROISSY CDG CEDEX France

http://www.sanyodenki.eu
Phone:+33 1 48 63 26 61

*Remarks:Specifications Are Subject To Change Without Notice.

06.12.N

RTA

Motion Control Systems

STEPPING MOTORS
CATALOGUE

SANYO DENKI

SANMOTION STEPPING SYSTEMS

STEPPING MOTORS
catalogue

SANYO DENKI

SANMOTION
STEPPING SYSTEMS

Warning / *Attenzione*

- The sole purpose of this catalogue is as a general introduction to our products, in order to allow an orientation as well as a choice among them. Detailed information concerning limitations and installation/utilization procedures are described in the manuals relating to each product. It is therefore essential to strictly refer to these enclosed technical manuals for a correct use, in accordance with current standards.

- All those products for which a speci?c obligation is required, as per law regulation in force in the European Community countries, bear the EC marking stating they are in accordance with the related directives.

- All products are classed as components foreseen to be integrated in a more complex machine or installation by a professional assembler, expert in the ?eld of motor drives and in their related problems. Only a professional assembler can install and put in service this component. The necessary installation recommendations are included in the technical manuals.

- R.T.A. reserves the right to modify the products at any time and without prior notice (including, but not limited to, characteristics, availability and prices).

- *Unico scopo di questo catalogo è una presentazione generale dei prodotti atta a consentire un orientamento e una scelta tra gli stessi. Informazioni precise e dettagliate in merito alle limitazioni e modalità di installazione ed uso sono riportate nei manuali tecnici relativi ai singoli prodotti. Pertanto, per un loro uso corretto e conforme alle normative in vigore, è indispensabile fare riferimento a tali manuali tecnici.*

- *Tutti quei prodotti per i quali vi è obbligo speci?co, ai sensi delle disposizioni di legge vigenti nei paesi della Comunità Europea, recano la marcatura CE attestante la conformità alle direttive che li riguardano.*

- *Tutti i prodotti riportati nel catalogo sono componenti atti ad essere integrati in apparecchiature o macchine più complesse. La loro installazione e messa in servizio deve essere fatta da un assemblatore professionale competente nel settore degli azionamenti per motori e delle loro problematiche. Le necessarie prescrizioni e indicazioni per la installazione sono incluse nei manuali tecnici.*

- *R.T.A. si riserva il diritto di apportare modi?che ai prodotti (includendo, senza limitazione alcuna, caratteristiche, disponibilità e prezzi) in qualsiasi momento e senza preavviso.*

CONTENTS

Page

INTRODUCTION 2

STEPPING MOTORS


SIZE 1.1" - □ 28 mm 12


SIZE 1.7" - □ 42 mm 13


SIZE 50 mm - □ 50 mm 19


SIZE 2.2" - □ 56 mm 21


SIZE 60 mm - □ 60 mm 31


SIZE 3.4" - Ø 85.8 mm 33


SIZE 3.4" - □ 85.5 mm 40


SIZE 4.2" - □ 106.4 mm 48

CONVERSION TABLE 54

STEPPING MOTORS WITH ENCODER

INTRODUCTION 58


SIZE 1.7" - □ 42 mm 60


SIZE 2.2" - □ 56 mm 61


SIZE 60 mm - □ 60 mm 63


SIZE 3.4" - □ 85.5 mm 64

R.T.A. GROUP

R.T.A. - HEADQUARTERS

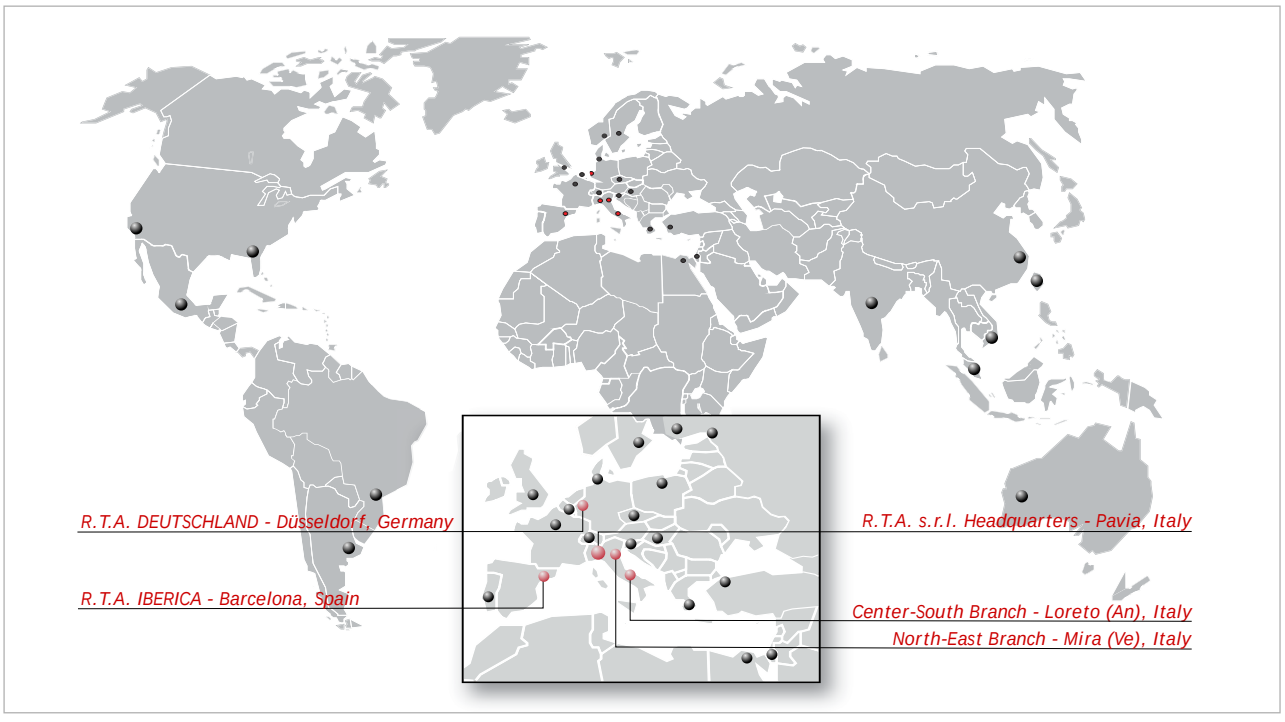
R.T.A. DEUTSCHLAND

R.T.A. IBERICA

- R.T.A. Group is a leading network of companies in the motion control industry. It is number one in Italy in the stepping systems market and number three in Europe in the stepping motor drives segment.
  [Source: IMS Research 2012]
- The Group is based on three operational companies: the headquarters, R.T.A. s.r.l. (ITALY), founded in 1976, R.T.A. Deutschland GmbH (GERMANY), founded in 2001 and R.T.A. IBERICA - Motion Control Systems S.L. (SPAIN), founded in 2008.
- R.T.A. has been producing stepping motor drives since 1976: since then more than 750.000 stepping motor drives have been sold in Italy and in more than 39 countries worldwide.
- Production and sales process quality is guaranteed by a Quality Assurance System certified under the UNI EN ISO 9001 (TUV-50 100 2153) Norm.
- Over time, R.T.A. product line has been enriched through the creation of a partnership with SANYO DENKI, a leading Japanese company producing stepping motors, brushless systems and fans. The Group has been its Italian sole distributor since 1989, while distributorship has been granted in 2001 for Germany and in 2008 for Spain.

R.T.A. WORLDWIDE

- Since its origins, the Group has always had a strong commitment for international business; that was the reason leading to the decision of opening direct branches in Germany and Spain.
- R.T.A. is also active worldwide through a wide network of distributors, composed by 29 companies operating in more than 39 countries.



R&D, PRODUCTION AND WAREHOUSE

R&D AND FIELD APPLICATION

- More than 30-years experience in the motion control industry
- 6 engineers fully dedicated to R&D
- 3 full-time field application engineers

STEPPING MOTOR DRIVES PRODUCTION

- More than 40.000 stepping motor drives produced yearly
- More than 750.000 drives sold since 1976
- Computerized testing line: every single drive is tested twice, by two different operators, guaranteeing a very high reliability
- Warranty: 24 months

INDUSTRIAL STRENGTH

- Wide warehouse of SANYO DENKI products:
  - more than 50.000 stepping motors
  - more than 3.000 AC servosystems
  - more than 5.000 cooling fans
- Very short time-to-market: 97% of orders is processed within one week from order.

ONLINE SALES: www.rta-store.com

- A wide selection of stepping motor drives available online
- SANYO DENKI stepping motors with flange size from 28 mm up to 106 mm and with holding torque from 12.5 Ncm to 2460 Ncm
- SANYO DENKI cooling fans with frame size from 36 mm to 172 mm.

MAIN PRODUCTION SITES

Kangawa Works (Japan)

- Total Production capacity: 310,000 stepping motors/month
- Main Factories:
  - Kangawa (Japan) Works since 2009
  - Subic (Philippines) Works since 2000

Subic Works (Philippines)

SANYO DENKI BENEFITS

- High Reliability & Quality
  - Sound experience in manufacturing since 1959
  - ISO 9001 & 14001 certification
  - Strong vertical integration and focus on process control
- Factory Support & Flexibility
  - Large production volume: 310 000 motors/month
  - Machine based assembling
  - Through process control & quality checks
- Technology Center
  - SANYO DENKI'S main product research and development facility
  - More than 300 Engineers
  - Since 1997

Acoustic radio wave anechoic chamber

Laboratories

Production line

Design rooms

SANYO DENKI & R.T.A. STEPPING MOTORS OVERVIEW

- SANYO DENKI experience and skills collected in over 80 years of activity in the motion control sector and R.T.A.'S 30 years of activity are able to offer a wide range of motors characterized by high performances:
  - high quality and reliability
  - low acoustic noise
  - excellent thermal performance
  - very large stock of motors, always available in our warehouse

- *Le competenze di SANYO DENKI accumulate in oltre 80 anni di attività nel settore del motion control unite all'esperienza trentennale di R.T.A. hanno permesso di selezionare una vasta gamma di motori caratterizzati da alte prestazioni:*
  - *alta qualità ed affidabilità*
  - *bassa rumorosità acustica*
  - *ottima performance da un punto di vista termico*
  - *consistente stock di motori sempre disponibili a magazzino*

□ 28mm — **FLANGE SIZE** — **□ 106.4mm**

12.5 Ncm — **HOLDING TORQUE** — **2460 Ncm**

R.T.A. PRODUCT LINES: STEPPING MOTORS & STEPPING MOTORS WITH ENCODER

STEPPING MOTORS

- STANDARD, H & SH SERIES:
  Motors with flange size from 1.1"(NEMA 11) up to 4.2" (NEMA 42) with holding torque from 12.5 Ncm to 24.6 Nm.
- SM SERIES:
  Motors with flange size 3.4"(NEMA 34), at high torque (from 3.6 Nm to 9.2 Nm).

MOTORI PASSO PASSO

- *SERIE H, SH & STANDARD:*
  Motori con flangia da 1.1" (NEMA 11) fino a 4.2" (NEMA 42) con coppie di tenuta da 12.5 Ncm a 24.6 Nm.
- *SERIE SM:*
  Motori con flangia 3.4"(NEMA 34), ad alta intensità di coppia (da 3.6 Nm a 9.2 Nm).

STEPPING MOTORS WITH ENCODER

- Motors with flange size: 42, 56, 60 & 85.5 mm, holding torque from 0.5 Nm to 9.2 Nm.
- Standard encoder resolution: 400 cycles per revolution (CPR). Also available upon request 500 & 1000 CPR.

MOTORI PASSO PASSO CON ENCODER

- *Motori con flangia: 42, 56, 60 & 85.5 mm, coppie erogabili da 0.5 Nm a 9.2 Nm.*
- *Risoluzione standard encoder: 400 cicli/giro. Disponibile anche su richiesta con risoluzione da 500 & 1000 cicli/giro.*

STANDARD, H & SH SERIES

- High performance in terms of torque and power.
- High torque/inertia ratios.
- Low acoustic noise.
- Limited vibrations generated by the motor body.
- Extremely performing thermal behaviour.
- Optimized constuction for a better exploitation of the advantages in terms of precision and noiselessness offered by microstepping drives.
- H and STANDARD stepping motors include: terminal box and IP55 protection degree models.

- *Elevate prestazioni in termini di coppia e di potenza.*
- *Elevati rapporti coppia/inerzia.*
- *Bassa rumorosità acustica.*
- *Limitate vibrazioni generate dal corpo motore.*
- *Ottime performance da un punto di vista termico.*
- *Costruzione ottimizzata per meglio sfruttare i vantaggi in termini di precisione e silenziosità offerti da azionamenti ad alto frazionamento di passo.*
- *Tra i nostri prodotti disponibili: modello con terminal box e grado di protezione IP55.*

SM SERIES

- The best performance in terms of torque and power.
- Optimized for usage with drives with any type of power supply, also directly from the main (230 VAC).
- Insulation voltage 250 VAC.
- Class F insulation.
- Optimized thermal and acoustic efficiency.
- Shaft with 14 mm diameter: robust and able to bear high radial loads.
- UL and CSA marking.

- *Prestazioni ancora più elevate in termini di coppia e di potenza.*
- *Costruzione ottimizzata per l'utilizzo con qualsiasi tipo di alimentazione, anche diretta da rete (230 VAC).*
- *Tensione di isolamento 250 VAC.*
- *Classe di isolamento F.*
- *Rendimento termico ed acustico ulteriormente ottimizzato.*
- *Albero di diametro 14 mm in grado di sostenere elevati carichi radiali.*
- *Marcatura UL e CSA.*

SPECIAL REQUIREMENTS & ACCESSORIES

IP65

- Versions in IP65 available
  Versioni in IP65 disponibili

BRAKE

- Versions with brake available
  Versioni con freno disponibili

- Gearboxes available
  Riduttori disponibili

(contact R.T.A. for more details / *contattare R.T.A per maggiori dettagli*)

MOTORS WITH ENCODER OVERVIEW

- All based on SANYO DENKI stepping motors
- Flange size: 42, 56, 60 & 85.5 mm
- Holding torque: from 0.5 to 9.0 Nm
- Standard signal: DIFFERENTIAL (SINGLE-ENDED version available)
- High flexibility in coupling with R.T.A. drives
- All motors with encoder are mounted and tested by R.T.A., following rigorous standards in accordance with R.T.A. best practices developed over more than 30 years of activity.

- *Tutti gli encoder sono assemblati su motori passo passo SANYO DENKI*
- *Flangia: 42, 56, 60 & 85.5 mm*
- *Coppie erogabili: da 0.5 a 9.0 Nm*
- *Segnale di uscita: DIFFERENZIALE (Versione SINGLE-ENDED disponibile)*
- *Massima versatilità nell'accoppiamento a driver R.T.A.*
- *Tutti i motori con encoder sono montati e testati da R.T.A., seguendo rigorose norme in conformità con le migliori pratiche sviluppate da R.T.A. in più di 30 anni di attività.*

ENCODER FEATURES

- Standard encoder resolution: 400 CPR (also available upon request 500 & 1000 CPR)
- Standard signal: DIFFERENTIAL (SINGLE-ENDED version available)
- INDEX versions available upon request

- *Risoluzione standard encoder: 400 cicli/giro (disponibili anche su richiesta 500 & 1000 cicli/giro)*
- *Segnale di uscita : DIFFERENZIALE (Versione SINGLE-ENDED disponibile)*
- *Disponibili su richiesta versioni con tacca di zero (INDEX)*

Stepping motors table of contents

SANYO DENKI
SANMOTION
STEPPING SYSTEMS

H, SH, SM & STANDARD Series SANYO DENKI Stepping Motors	HOLDING TORQUE *COPPIA DI TENUTA* (Ncm.)	FLANGE SIZE *DIMENSIONI FLANGIA* (mm.)	LENGTH *LUNGHEZZA* (mm.)	CURRENT *CORRENTE* (Amp)	TECHNICAL DATA *DATI TECNICI* (page/pagina)	VERSION WITH ENCODER *VERSIONE CON ENCODER*
SIZE 1.1" - ☐ 28 mm.						
SH2285-5271	14.5	☐ 28	51.5	0.70*	12	
SIZE 1.7" - ☐ 42 mm.						
103-546-55500	12.5	☐ 42	32.5	0.20	13	
103-546-5342	19	☐ 42	32.5	0.42*	14	
103-547-52500 (103-547-52300)	25	☐ 42	36.5	0.70*	15	
103-H5208-0483	42	☐ 42	39.0	0.90*	16	
103-H5210-4240	51	☐ 42	48.0	1.00	17	
103-H5210-4541 (103-H5210-4512)	51	☐ 42	48.0	2.00	18	■ Pag.60
SIZE 50 mm. - ☐ 50 mm.						
103-H6701-0140 (103-H6701-0113)	38	☐ 50	39.8	0.70*	19	
103-H6703-0440	68	☐ 50	51.3	1.40*	20	
SIZE 2.2" - ☐ 56 mm.						
103-H7121-0440	49	☐ 56	41.8	1.50*	21	
103-H7123-0140	110	☐ 56	53.8	0.70*	22	
103-H7123-0440	110	☐ 56	53.8	1.50	23	
103-H7123-5040 (103-H7123-5010)	85	☐ 56	53.8	2.00	24	
103-H7123-0740 (103-H7123-0710)	110	☐ 56	53.8	2.20*	25	
103-H7123-1749 (103-H7123-1711)	110	☐ 56	53.8	4.00	26	■ Pag.61
103-H7126-0140	165	☐ 56	75.8	0.75*	27	
103-H7126-0740 (103-H7126-0710)	165	☐ 56	75.8	2.20*	28	
103-H7126-1740 (103-H7126-1710)	165	☐ 56	75.8	4.00	29	■ Pag.62
103-H7126-6640 (103-H7126-6610)	165	☐ 56	75.8	5.60	30	
SIZE 60 mm. - ☐ 60 mm.						
103-H7823-0740	300	☐ 60	85.8	2.20*	31	
103-H7823-1740 (103-H7823-1714)	300	☐ 60	85.8	4.00	32	■ Pag.63
SIZE 3.4" - Ø 85.8 mm.						
103-845-6741 (103-845-6711)	510	Ø 85.8	130.0	9.50	33	
103-845-67S1	510	Ø 85.8	133.0	9.50	34	
103-845-67S41	510	Ø 85.8	153.0	9.50	35	
103-H8221-6241 (103-H8221-6211)	300	Ø 85.8	62.0	6.00	36	
103-H8221-62S41	300	Ø 85.8	82.9	6.00	37	
103-H8222-6340 (103-H8222-6310)	560	Ø 85.8	92.2	6.00	38	
103-H8223-6540 (103-H8223-6510)	790	Ø 85.8	125.9	9.00	39	
SIZE 3.4" - ☐ 85.5 mm.						
SM 2861-5055 (SM 2861-5025)	360	☐ 85.5	66.0	2.00	40	■ Pag.67
SM 2861-5255 (SM 2861-5225)	360	☐ 85.5	66.0	6.00	41	■ Pag.64
SM 2862-5055	700	☐ 85.5	96.5	2.00	42	
SM 2862-5155 (SM 2862-5125)	700	☐ 85.5	96.5	4.00	43	■ Pag.68
SM 2862-5156	700	☐ 85.5	128.4	4.00	44	
SM 2862-5255 (SM 2862-5225)	700	☐ 85.5	96.5	6.00	45	■ Pag.65
SM 2863-5155 (SM 2863-5126)	920	☐ 85.5	127.0	4.00	46	■ Pag.69
SM 2863-5255 (SM 2863-5225)	920	☐ 85.5	127.0	6.00	47	■ Pag.66
SIZE 4.2" - ☐ 106.4 mm.						
103-8932-6451 (103-8932-6421)	1330	☐ 106.4	186.9	12.70	48	
103-8960-6551	2060	☐ 106.4	245.0	14.10	49	
103-H89222-6341 (103-H89222-6311)	1620	☐ 106.4	163.0	6.00	50	
103-H89222-6541	1620	☐ 106.4	163.0	10.00	51	
103-H89223-6341 (103-H89223-6311)	2460	☐ 106.4	221.0	6.00	52	
103-H89223-6641 (103-H89223-6611)	2460	☐ 106.4	221.0	12.00	53	

NOTE: Codes between brackets refer to double shaft models.
NOTA: i codici tra parentesi si riferiscono ai modelli bialbero.

*Bipolar series connection.
**Collegamento bipolare serie.*

SUGGESTED MOTOR/DRIVE COUPLING

- The following tables show suggested motor/drive coupling between SANYO DENKI stepping motors and R.T.A. Drives.
- R.T.A. suggests contacting its commercial personnel to verify and validate the optimal motor / drive coupling.
- PLUS E, PLUS L, PLUS ET and X-PLUS ET series drives require coupling with R.T.A. EM series motors. Ask R.T.A. for details.
- The motors with a lower current than that provided by our drives, are not present in the following table.

- *Nelle tabelle seguenti sono indicati gli accoppiamenti motore/serie di azionamenti consigliati da R.T.A.*
- *R.T.A. consiglia di contattare il proprio personale commerciale per verificare e validare l'ottimale accoppiamento fra motore e azionamento.*
- *Gli azionamenti serie PLUS E, PLUS L, PLUS ET e X-PLUS ET prevedono l'accoppiamento con motori serie EM. Contattare R.T.A. per ulteriori dettagli.*
- *I motori che hanno una corrente inferiore a quella contemplata dai nostri azionamenti, non sono presenti nella tabella sottostante.*

H, SH, SM & STANDARD Series SANYO DENKI Stepping Motors *Motori passo-passo SANYO DENKI serie H, SH, SM e Standard*	R.T.A. Drives / *Azionamenti R.T.A.**													
	BSD	CSD	CSD J	A-CSD	NDC	A-NDC	ADW	HGD	PLUS A/B	PLUS K	PLUS J	X-PLUS B	X-MIND B	X-MIND K
SIZE 1.1" - ☐ 28 mm.														
SH2285-5271	■	■		■	■	■		■						
SIZE 1.7" - ☐ 42 mm.														
103-H5208-0483	■	■		■	■	■		■						
103-H5210-4240	■	■		■	■	■	■	■						
103-H5210-4541 (103-H5210-4512)	■	■		■	■	■		■						
SIZE 50 mm. - ☐ 50 mm.														
103-H6701-0140 (103-H6701-0113)	■	■		■	■	■		■						
103-H6703-0440	■	■		■	■	■		■						
SIZE 2.2" - ☐ 56 mm.														
103-H7121-0440	■	■		■	■	■		■						
103-H7123-0140	■	■		■	■	■		■						
103-H7123-0440	■	■		■	■	■		■						
103-H7123-5040 (103-H7123-5010)	■	■		■	■	■		■						
103-H7123-0740 (103-H7123-0710)	■	■		■	■	■	■	■						
103-H7123-1749 (103-H7123-1711)		■	■	■	■	■	■	■	■	■	■			
103-H7126-0140	■	■		■	■	■		■						
103-H7126-0740 (103-H7126-0710)	■	■		■	■	■	■	■						
103-H7126-1740 (103-H7126-1710)		■	■	■	■	■	■	■	■	■	■			
103-H7126-6640 (103-H7126-6610)					■	■	■	■	■	■	■			
SIZE 60 mm. - ☐ 60 mm.														
103-H7823-0740	■						■							
103-H7823-1740 (103-H7823-1714)		■	■	■	■	■	■	■	■	■	■			
SIZE 3.4" - Ø 85.8 mm.														
103-845-6741 (103-845-6711)									■	■				
103-845-67S1									■	■				
103-845-67S41									■	■				
103-H8221-6241 (103-H8221-6211)					■	■		■	■	■	■			
103-H8221-62S41					■	■		■	■	■	■			
103-H8222-6340 (103-H8222-6310)					■	■		■	■	■	■			
103-H8223-6540 (103-H8223-6510)									■	■				
SIZE 3.4" - ☐ 85.5 mm.														
SM 2861-5055 (SM 2861-5025)												■	■	■
SM 2861-5255 (SM 2861-5225)					■	■	■	■	■	■	■			
SM 2862-5055												■	■	■
SM 2862-5155 (SM 2862-5125)												■	■	■
SM 2862-5156												■	■	■
SM 2862-5255 (SM 2862-5225)					■	■	■	■	■	■	■			
SM 2863-5155 (SM 2863-5126)												■	■	■
SM 2863-5255 (SM 2863-5225)					■	■	■	■	■	■	■			
SIZE 4.2" - ☐ 106.4 mm.														
103-H89222-6341 (103-H89222-6311)									■	■	■		■	■
103-H89223-6341 (103-H89223-6311)									■	■	■		■	■

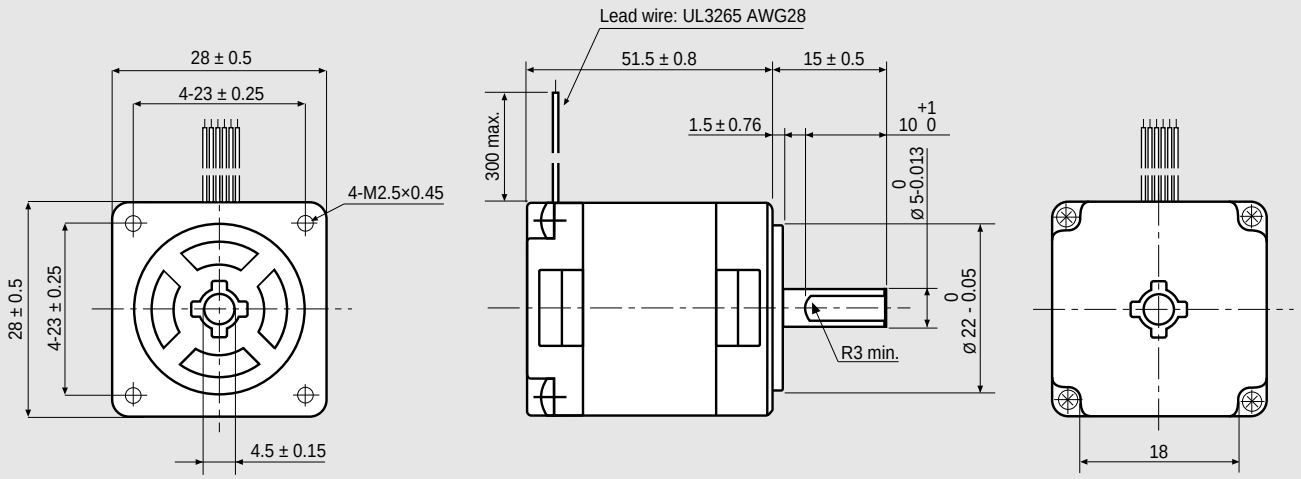
NOTE: Codes between brackets refer to double shaft models.
NOTA: i codici tra parentesi si riferiscono ai modelli bialbero.

*For more info, please refer to www.rta.it
**Per ulteriori informazioni, si veda www.rta.it*

SH2285-5271

SANYO DENKI
SANMOTION

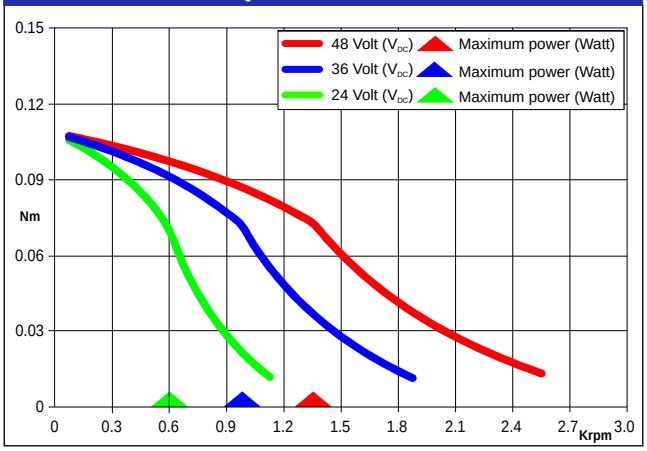
Dimensions (Unit:mm)



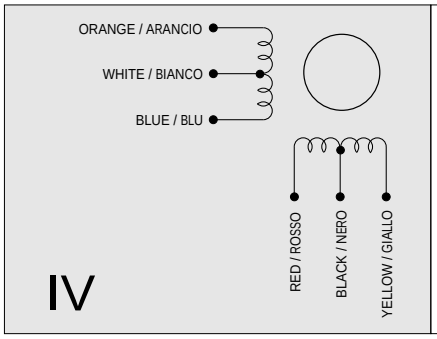
FEATURES

MODEL		SH2285-5271
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	0.7(*)
UNIPOLAR CURRENT	(Amp)	1.0
RESISTANCE	(Ohm)	4.1
INDUCTANCE	(mH)	1.9
BIPOLAR HOLDING TORQUE	(Ncm)	14.5
UNIPOLAR HOLDING TORQUE	(Ncm)	11.5
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	22
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	66000
BACK E.M.F.	(V/Krpm)	15
MASS	(Kg)	0.2
LEADS CODE		IV

TORQUE/SPEED CURVE



(*)Bipolar series connection.
(*)*Collegamento bipolare serie.*

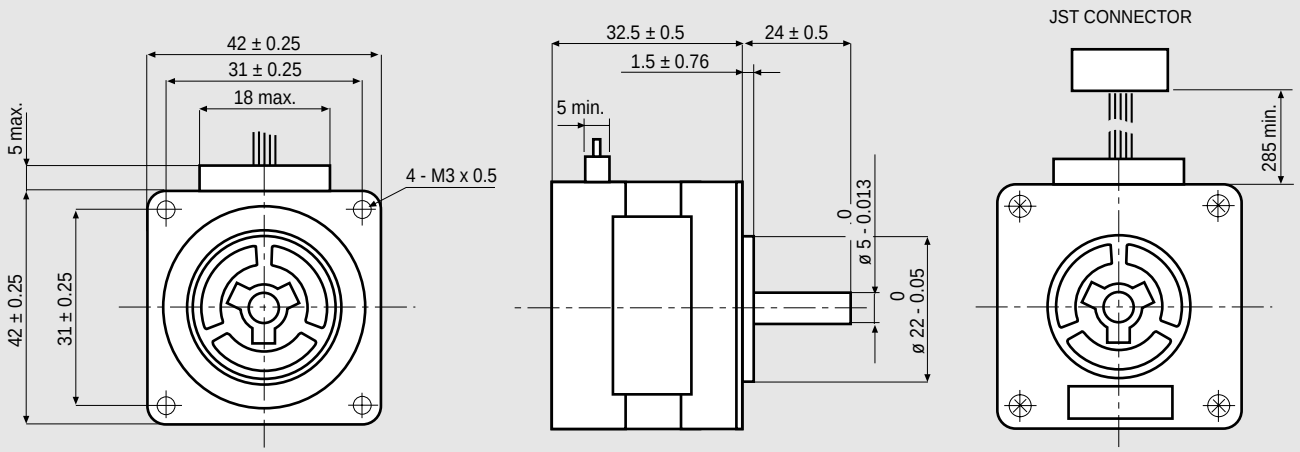


Suggested R.T.A. driver: BSD Series, CSD/A-CSD Series, NDC/A-NDC Series, HGD Series.

103-546-55500

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

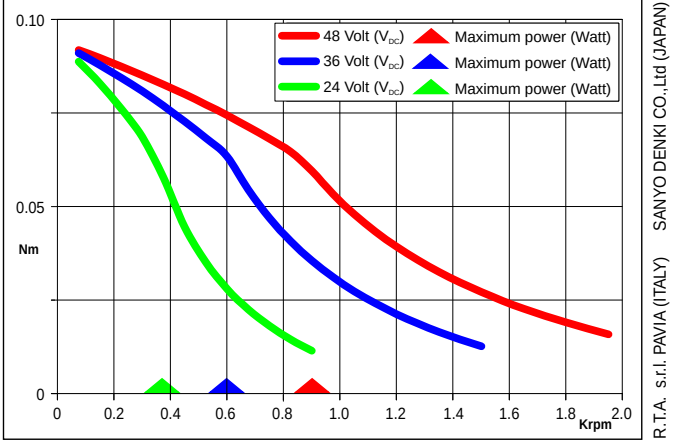


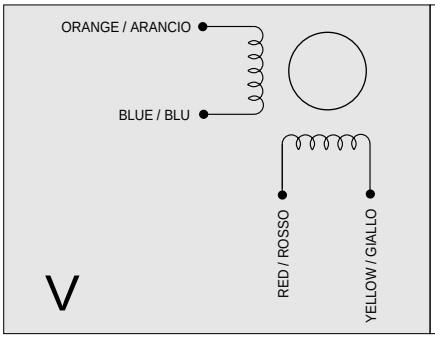
MOTOR CONNECTOR IS JST mod. EHR-4A/ EHR-6 at 4 / 6 POLES FEMALE.
FOR CONNECTION USE JST mod. B4B-EH-A/ B6B-EH-A MALE CONNECTOR.

FEATURES

MODEL		103-546-55500
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	0.2
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	37.5
INDUCTANCE	(mH)	52
BIPOLAR HOLDING TORQUE	(Ncm)	12.5
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	20
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	63000
BACK E.M.F.	(V/Krpm)	47
MASS	(Kg)	0.2
LEADS CODE		V

TORQUE/SPEED CURVE



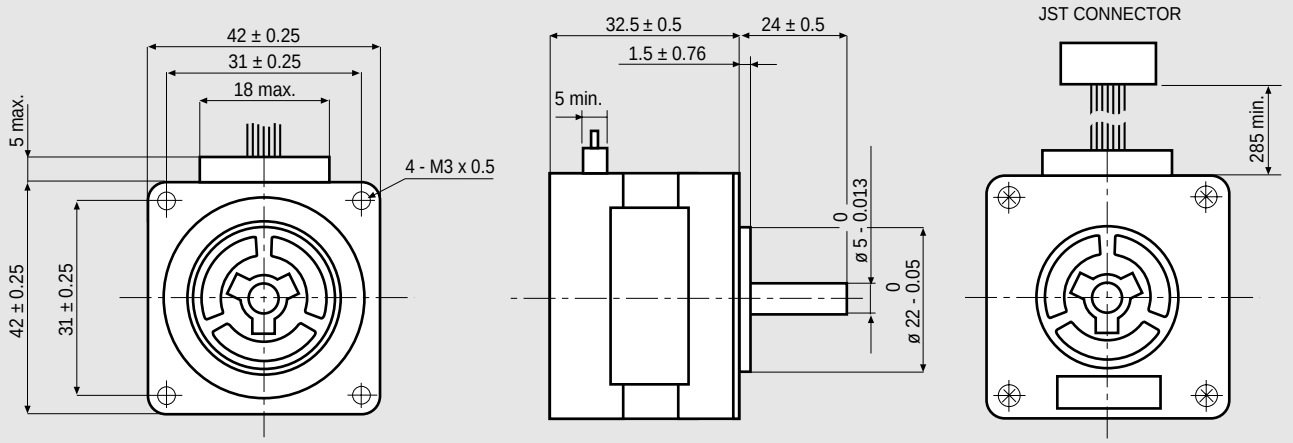


Suggested driver: contact R.T.A.

103-546-5342

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

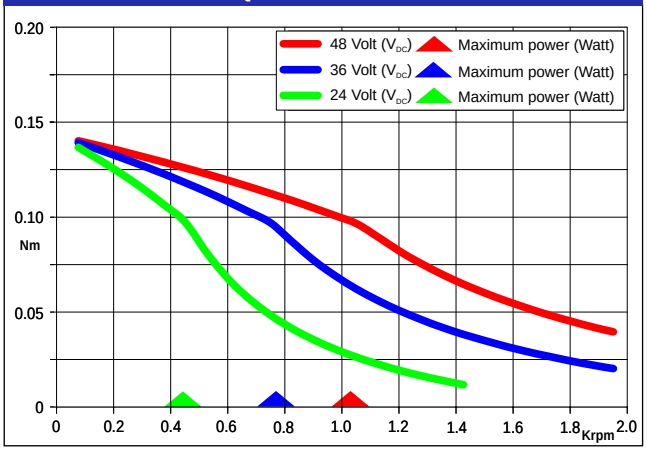


MOTOR CONNECTOR IS JST mod. EHR-4A/ EHR-6 at 4 / 6 POLES FEMALE.
FOR CONNECTION USE JST mod. B4B-EH-A/ B6B-EH-A MALE CONNECTOR.

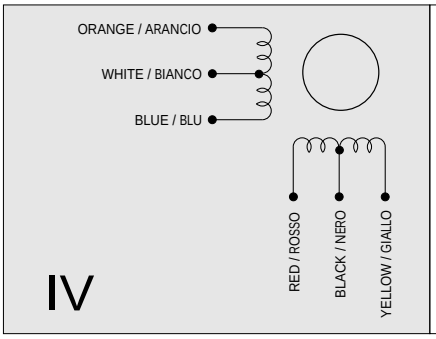
FEATURES

MODEL		103-546-5342
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	0.42 (*)
UNIPOLAR CURRENT	(Amp)	0.6
RESISTANCE	(Ohm)	6.7
INDUCTANCE	(mH)	5.4
BIPOLAR HOLDING TORQUE	(Ncm)	19
UNIPOLAR HOLDING TORQUE	(Ncm)	14.5
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	30
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	63000
BACK E.M.F.	(V/Krpm)	18
MASS	(Kg)	0.2
LEADS CODE		IV

TORQUE/SPEED CURVE



(*)Bipolar series connection.
(*)*Collegamento bipolare serie.*



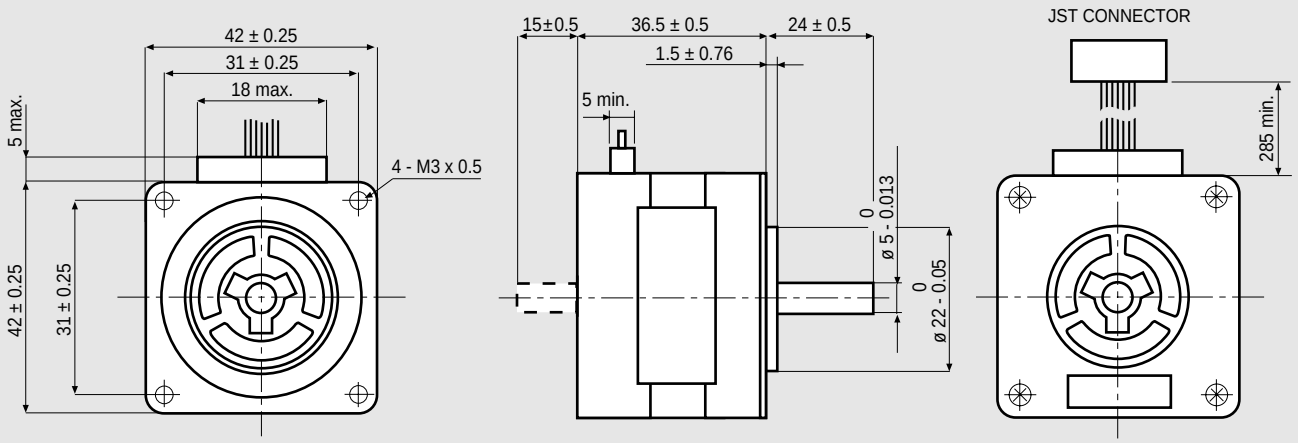
Suggested driver: contact R.T.A.

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

103-547-52500

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)



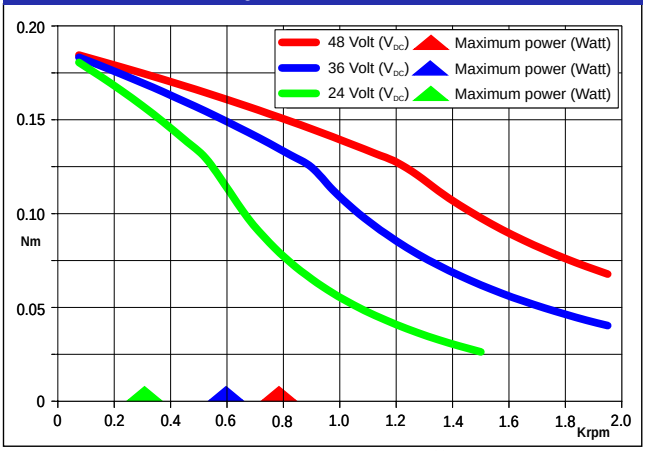
MOTOR CONNECTOR IS JST mod. EHR-4A/ EHR-6 at 4 / 6 POLES FEMALE.
FOR CONNECTION USE JST mod. B4B-EH-A/ B6B-EH-A MALE CONNECTOR.

FEATURES

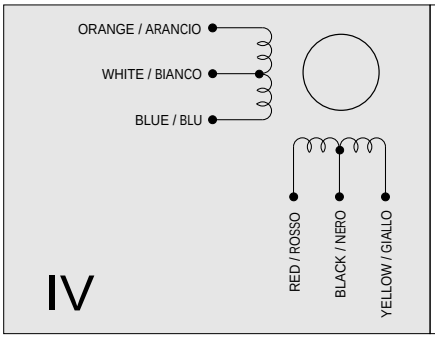
MODEL		103-547-52500 (103-547-52300)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	0.7 (*)
UNIPOLAR CURRENT	(Amp)	1.0
RESISTANCE	(Ohm)	3.15
INDUCTANCE	(mH)	3
BIPOLAR HOLDING TORQUE	(Ncm)	25
UNIPOLAR HOLDING TORQUE	(Ncm)	19
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	43
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	59000
BACK E.M.F.	(V/Krpm)	14
MASS	(Kg)	0.24
LEADS CODE		IV

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE



(*)Bipolar series connection.
(*)*Collegamento bipolare serie.*



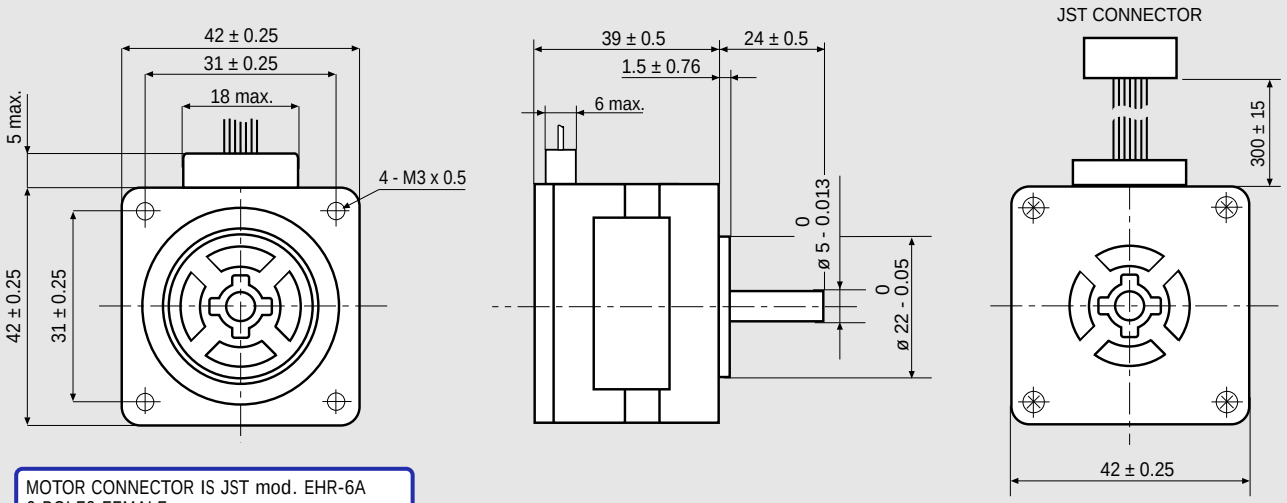
Suggested driver: contact R.T.A.

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

103-H5208-0483

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

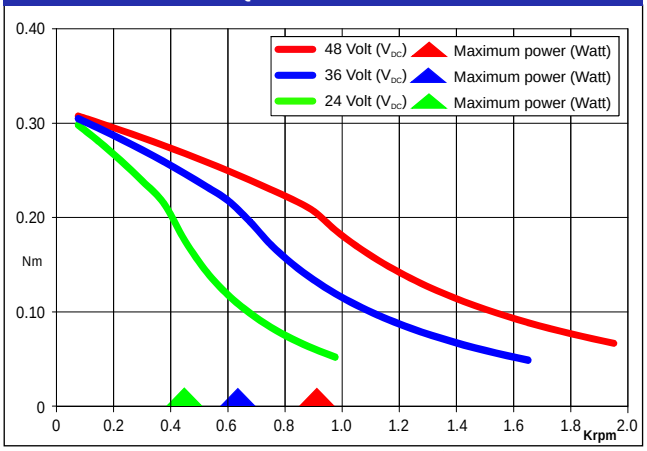


MOTOR CONNECTOR IS JST mod. EHR-6A
6 POLES FEMALE.
FOR CONNECTION USE JST
mod. B6B-EH-A MALE CONNECTOR.

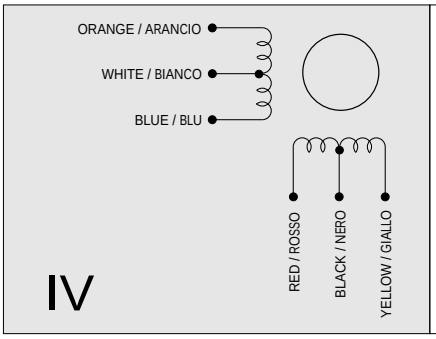
FEATURES

MODEL		103-H5208-0483
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	0.9(*)
UNIPOLAR CURRENT	(Amp)	1.2
RESISTANCE	(Ohm)	2.9
INDUCTANCE	(mH)	3.4
BIPOLAR HOLDING TORQUE	(Ncm)	42
UNIPOLAR HOLDING TORQUE	(Ncm)	30
ROTOR INERTIA	($Kgm^2 \times 10^{-7}$)	56
THEORETICAL ACCELERATION	($rad \times sec.^{-2}$)	71000
BACK E.M.F.	(V/Krpm)	19
MASS	(Kg)	0.27
LEADS CODE		IV

TORQUE/SPEED CURVE



(*)Bipolar series connection.
(*)*Collegamento bipolare serie.*

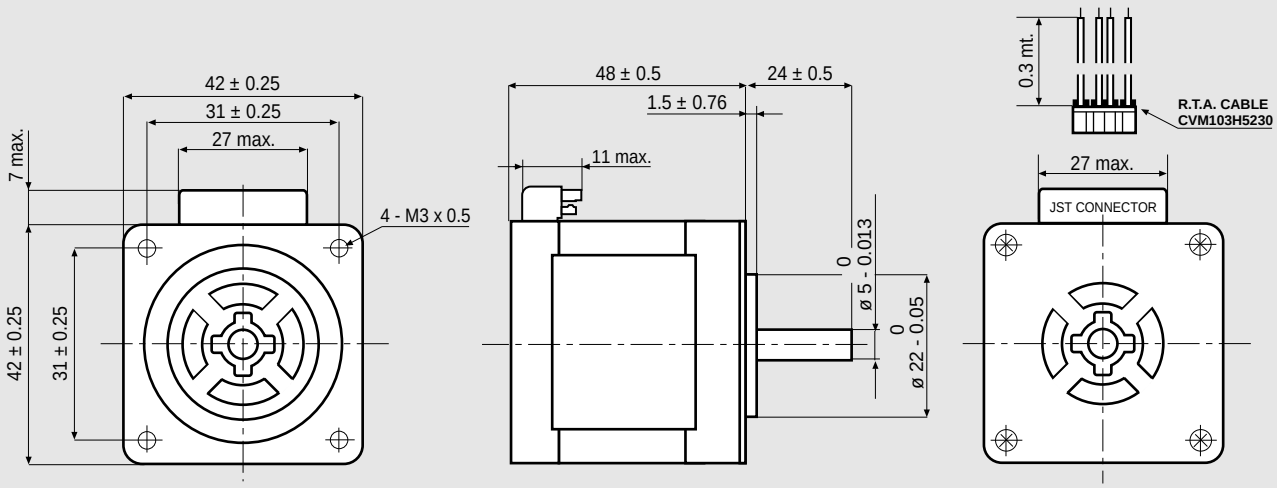


Suggested R.T.A. driver: BSD Series, CSD/A-NDC Series, NDC/A-NDC Series, HGD Series.

103-H5210-4240

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

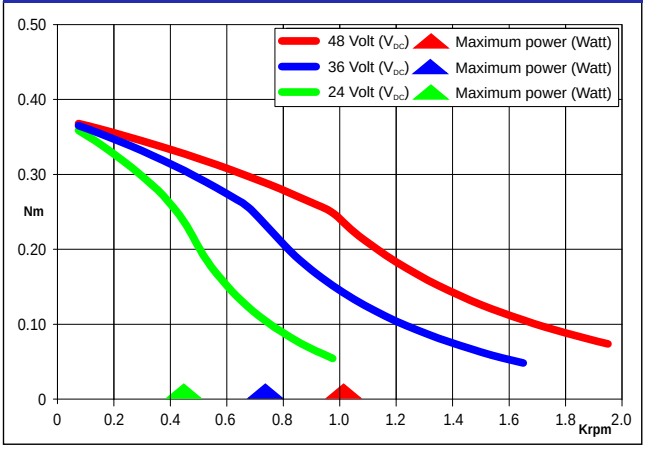


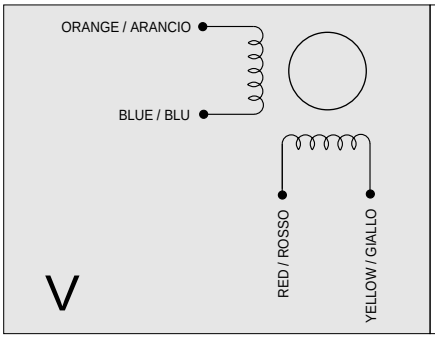
MOTOR CONNECTOR IS JST mod. B6B-EH K 6 POLES MALE.
FOR CONNECTION USE JST mod. EHR-6 FEMALE CONNECTOR AND mod. SEH-001 T-P0.6 CONTACTS.
NOTE: 103-H5210-4240 MOTORS NEED CVM103H5230 R.T.A. CABLES.
CONTACT R.T.A. FOR FURTHER DETAILS.

FEATURES

MODEL		103-H5210-4240
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	1.0
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	4.8
INDUCTANCE	(mH)	9.5
BIPOLAR HOLDING TORQUE	(Ncm)	51
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	74
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	69000
BACK E.M.F.	(V/Krpm)	14
MASS	(Kg)	0.35
LEADS CODE		V

TORQUE/SPEED CURVE





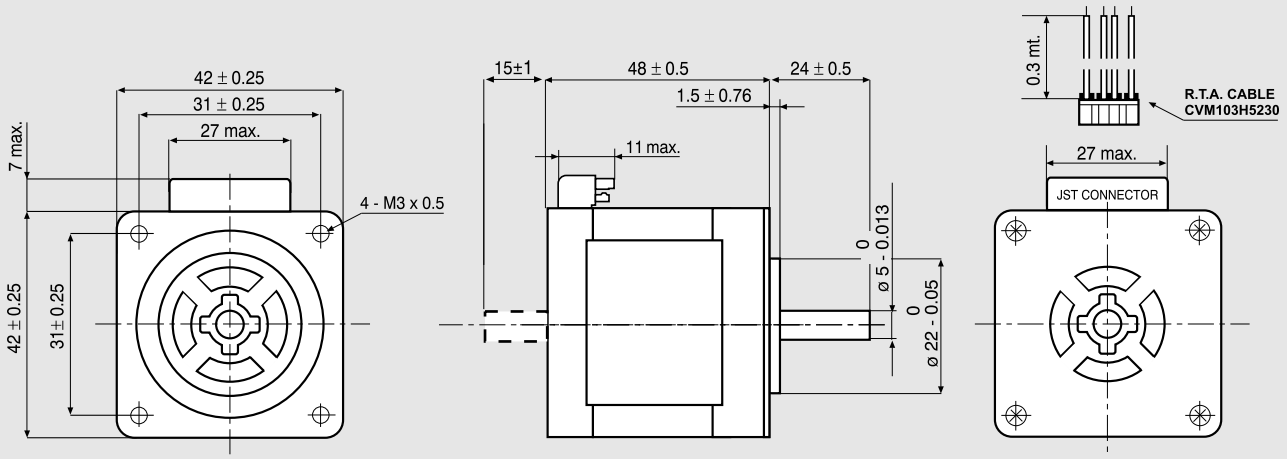
Suggested R.T.A. driver: BSD Series, CSD/A-CSD Series, NDC/A-NDC Series, ADW Series, HGD Series.

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

103-H5210-4541

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)



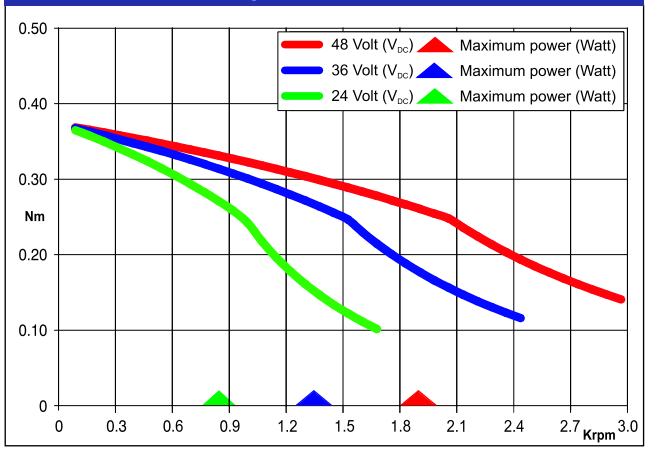
MOTOR CONNECTOR IS JST mod. B6B-EH K 6 POLES MALE.
FOR CONNECTION USE JST mod. EHR-6 FEMALE CONNECTOR AND mod. SEH-001 T-P0.6 CONTACTS.
NOTE: 103-H5210-4541/4512 MOTORS NEED CVM103H5230 R.T.A. CABLES. CONTACT R.T.A. FOR FURTHER DETAILS.

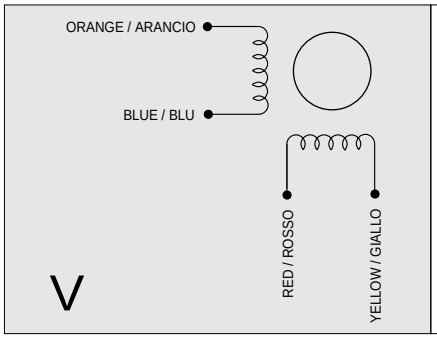
FEATURES

MODEL		103-H5210-4541 (103-H5210-4512)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	2.0
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	1.25
INDUCTANCE	(mH)	2.4
BIPOLAR HOLDING TORQUE	(Ncm)	51
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	74
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	69000
BACK E.M.F.	(V/Krpm)	25
MASS	(Kg)	0.35
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

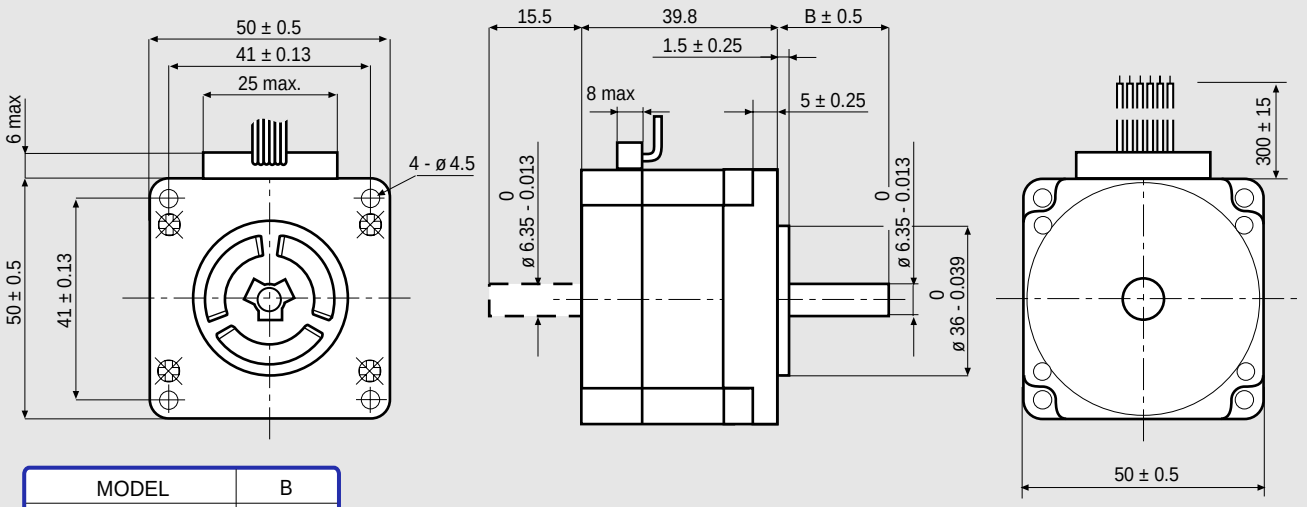
TORQUE/SPEED CURVE





Suggested R.T.A. driver: BSD Series, CSD/A-CSD Series, NDC/A-NDC Series, HGD Series.

Dimensions (Unit:mm)



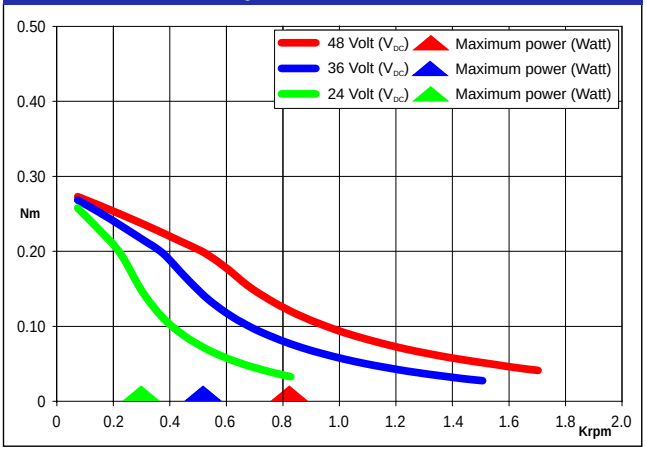
MODEL	B
103 - H6701 - 0140	20.6
103 - H6701 - 0113	28

FEATURES

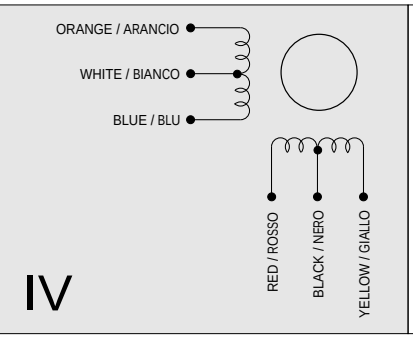
MODEL		103-H6701-0140 (103-H6701-0113)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	0.7 (*)
UNIPOLAR CURRENT	(Amp)	1.0
RESISTANCE	(Ohm)	4.3
INDUCTANCE	(mH)	6.8
BIPOLAR HOLDING TORQUE	(Ncm)	38
UNIPOLAR HOLDING TORQUE	(Ncm)	28
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	57
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	66000
BACK E.M.F.	(V/Krpm)	20
MASS	(Kg)	0.35
LEADS CODE		IV

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE



(*)Bipolar series connection.
(*)*Collegamento bipolare serie.*



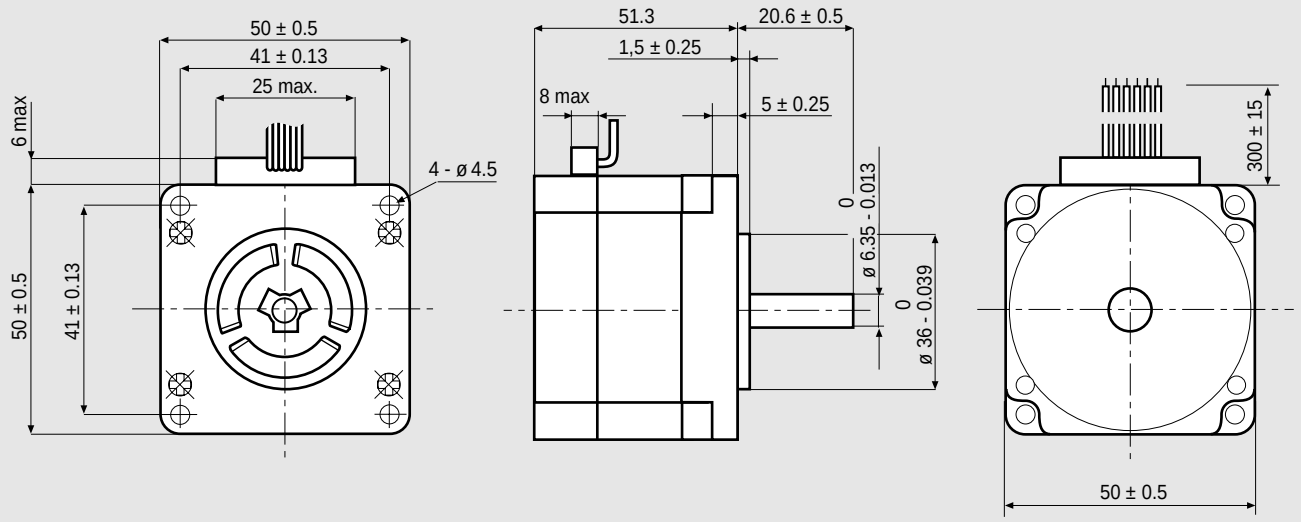
Suggested R.T.A. driver: BSD Series, CSD/A-CSD Series, NDC/A-NDC Series, HGD Series.

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

103-H6703-0440

SANYO DENKI
SANMOTION

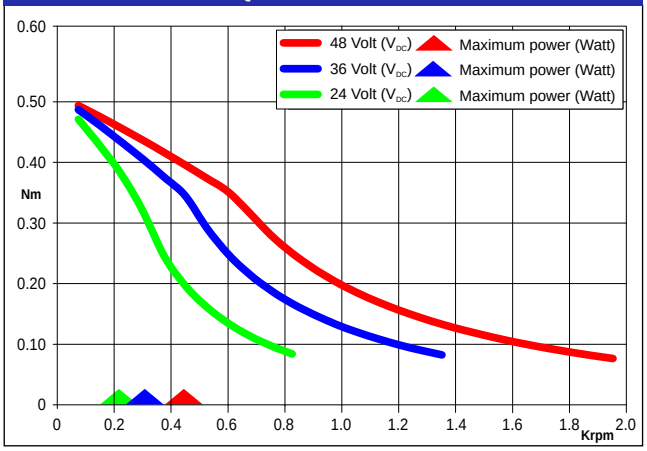
Dimensions (Unit:mm)



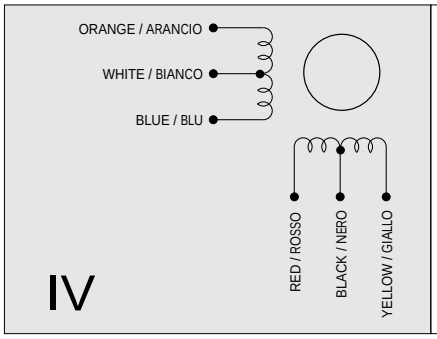
FEATURES

MODEL		103-H6703-0440
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	1.4(*)
UNIPOLAR CURRENT	(Amp)	2.0
RESISTANCE	(Ohm)	1.6
INDUCTANCE	(mH)	3.2
BIPOLAR HOLDING TORQUE	(Ncm)	68
UNIPOLAR HOLDING TORQUE	(Ncm)	49
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	118
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	58000
BACK E.M.F.	(V/Krpm)	17.5
MASS	(Kg)	0.5
LEADS CODE		IV

TORQUE/SPEED CURVE



(*)Bipolar series connection.
(*)*Collegamento bipolare serie.*

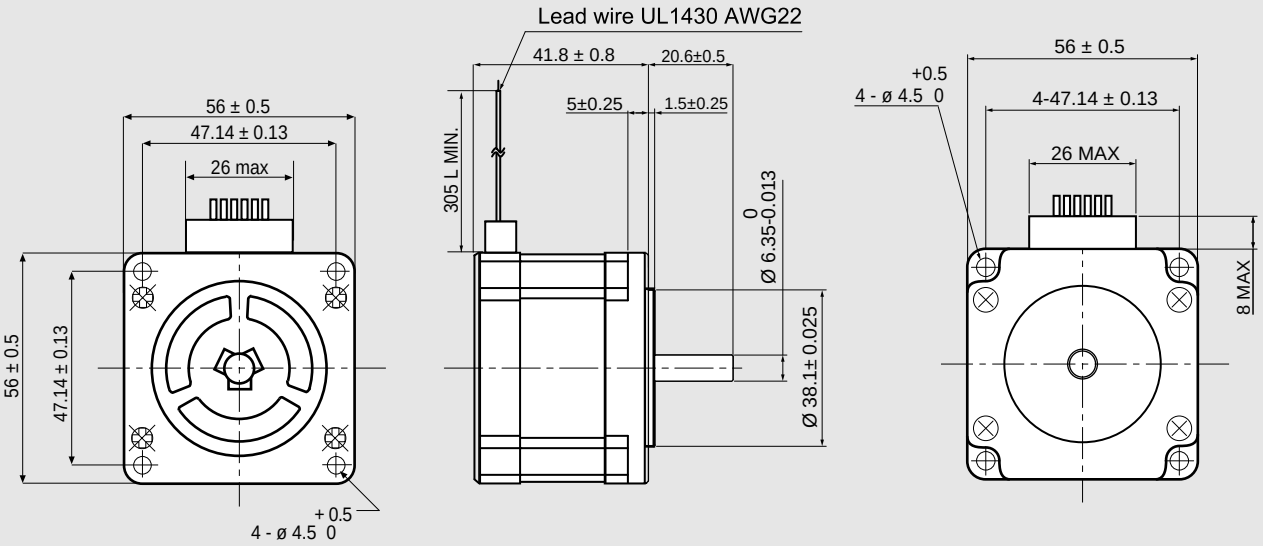


Suggested R.T.A. driver: BSD Series, CSD/A-CSD Series, NDC/A-NDC Series, HGD Series.

103-H7121-0440

SANYO DENKI
SANMOTION

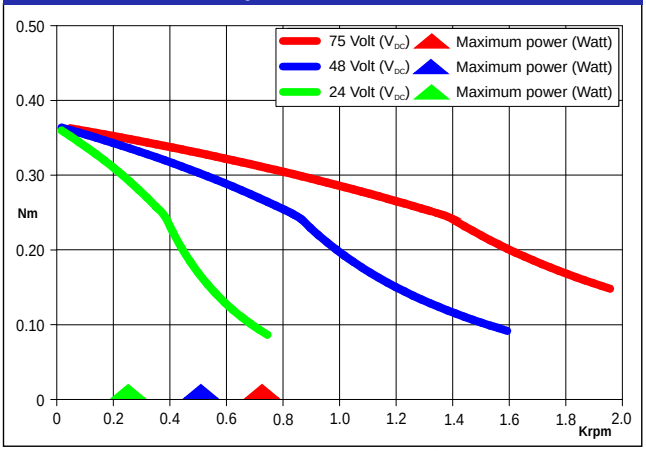
Dimensions (Unit:mm)



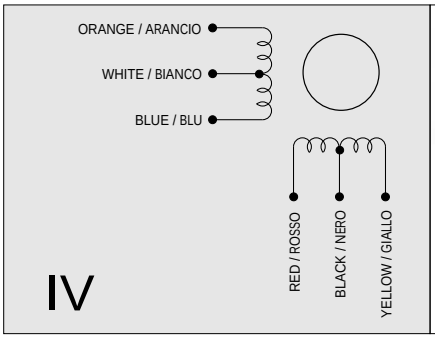
FEATURES

MODEL		103-H7121-0440
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	1.5 (*)
UNIPOLAR CURRENT	(Amp)	2.0
RESISTANCE	(Ohm)	1.25
INDUCTANCE	(mH)	1.9
BIPOLAR HOLDING TORQUE	(Ncm)	49
UNIPOLAR HOLDING TORQUE	(Ncm)	39
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	100
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	50000
BACK E.M.F.	(V/Krpm)	20
MASS	(Kg)	0.47
LEADS CODE		IV

TORQUE/SPEED CURVE



(*)Bipolar series connection.
(*)*Collegamento bipolare serie.*



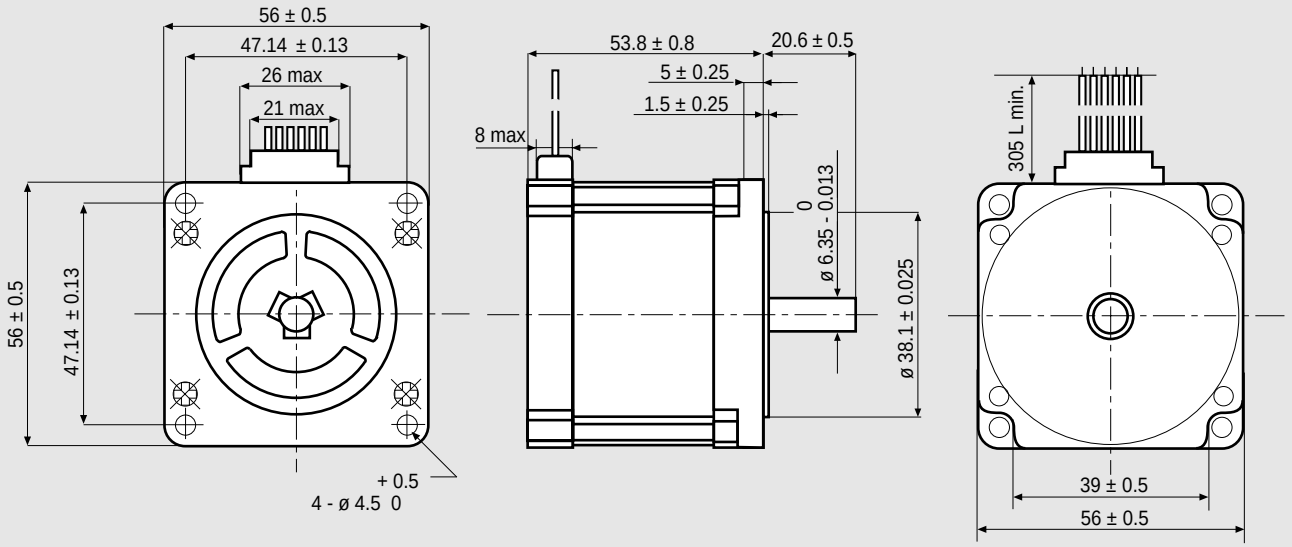
Suggested R.T.A. driver: BSD Series, CSD/A-CSD Series, NDC/A-NDC Series, HGD Series.

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

103-H7123-0140

SANYO DENKI
SANMOTION

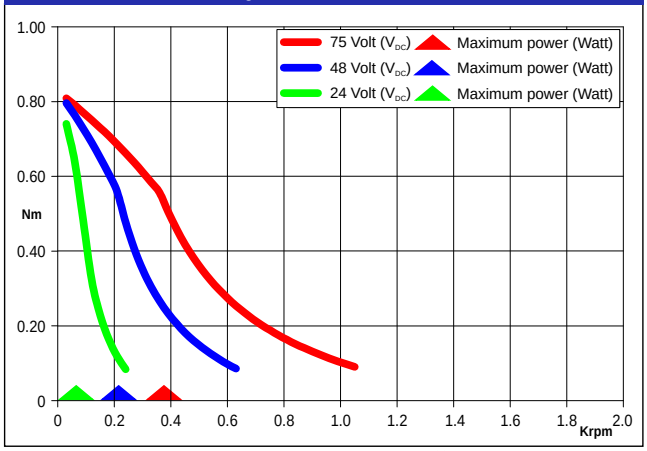
Dimensions (Unit:mm)



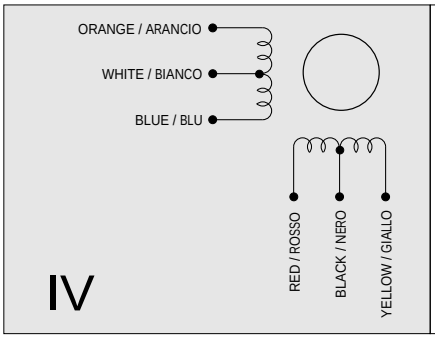
FEATURES

MODEL		103-H7123-0140
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	0.7 (*)
UNIPOLAR CURRENT	(Amp)	1.0
RESISTANCE	(Ohm)	6.7
INDUCTANCE	(mH)	15
BIPOLAR HOLDING TORQUE	(Ncm)	110
UNIPOLAR HOLDING TORQUE	(Ncm)	85
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	210
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	50000
BACK E.M.F.	(V/Krpm)	60
MASS	(Kg)	0.65
LEADS CODE		IV

TORQUE/SPEED CURVE



(*)Bipolar series connection.
(*)*Collegamento bipolare serie.*

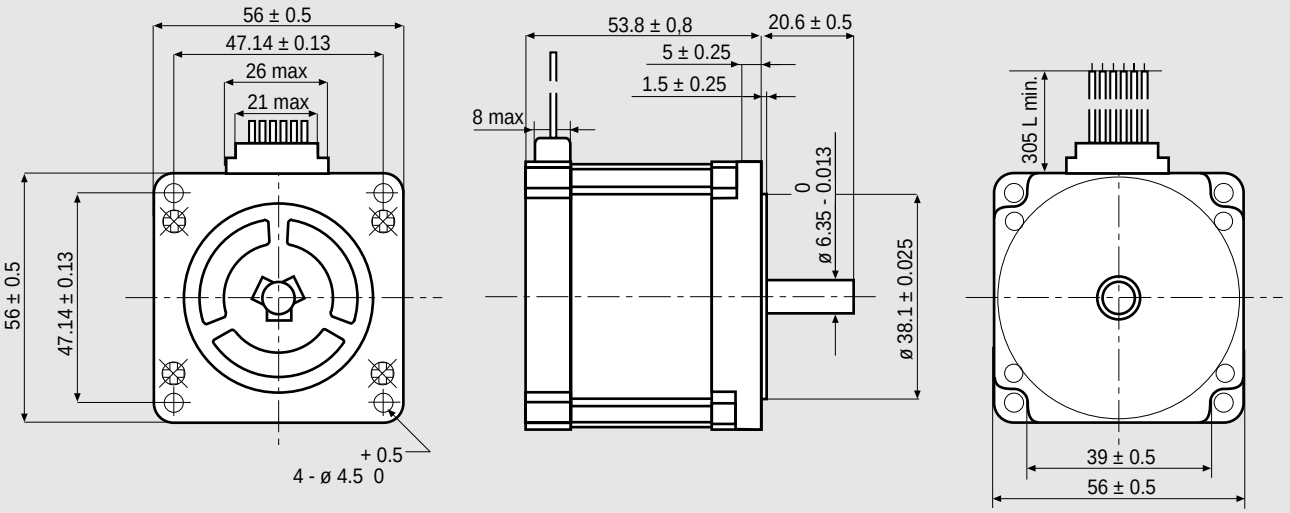


Suggested R.T.A. driver: BSD Series, CSD/A-CSD Series, NDC/A-NDC Series, HGD Series.

103-H7123-0440

SANYO DENKI
SANMOTION

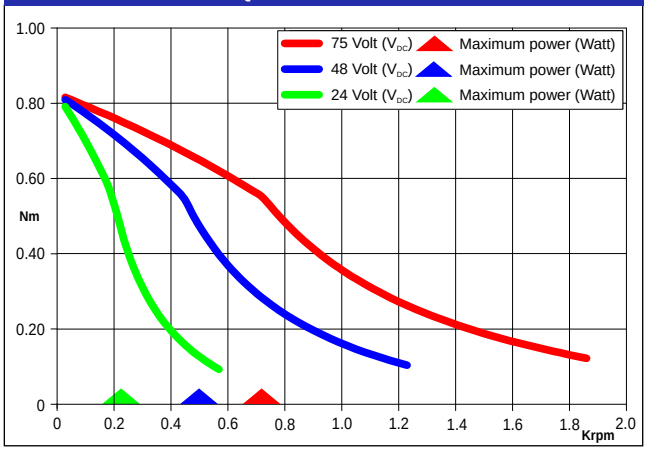
Dimensions (Unit:mm)



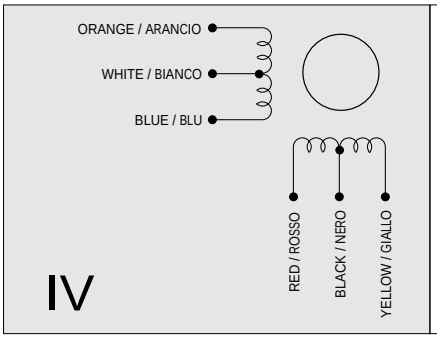
FEATURES

MODEL		103-H7123-0440
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	1.5(*)
UNIPOLAR CURRENT	(Amp)	2.0
RESISTANCE	(Ohm)	1.6
INDUCTANCE	(mH)	3.8
BIPOLAR HOLDING TORQUE	(Ncm)	110
UNIPOLAR HOLDING TORQUE	(Ncm)	85
ROTOR INERTIA	($Kgm^2 \times 10^{-7}$)	210
THEORETICAL ACCELERATION	($rad \times sec.^{-2}$)	50000
BACK E.M.F.	(V/Krpm)	31
MASS	(Kg)	0.65
LEADS CODE		IV

TORQUE/SPEED CURVE



(*)Bipolar series connection.
(*)*Collegamento bipolare serie.*

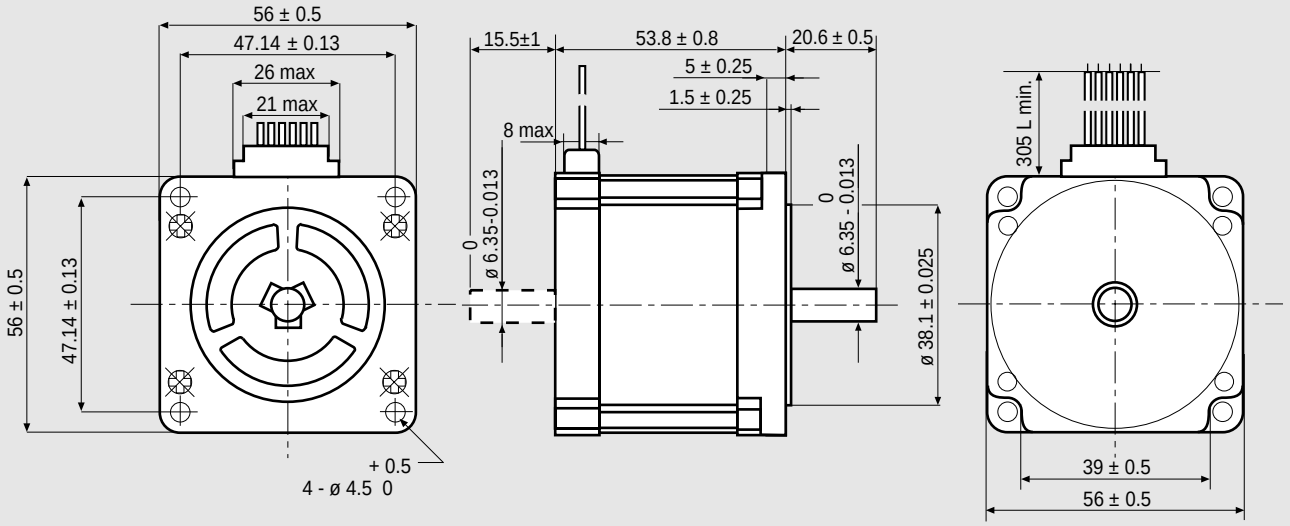


Suggested R.T.A. driver: BSD Series, CSD/A-CSD Series, NDC/A-NDC Series, HGD Series.

103-H7123-5040

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

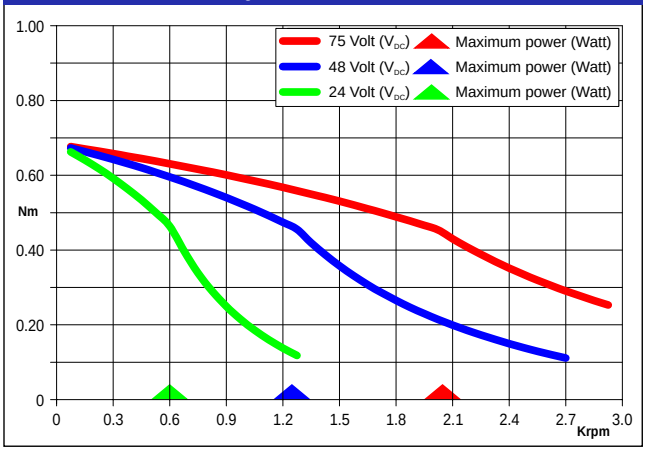


FEATURES

MODEL		103-H7123-5040 (103-H7123-5010)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	2.0
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	0.8
INDUCTANCE	(mH)	3.8
BIPOLAR HOLDING TORQUE	(Ncm)	85
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	210
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	38500
BACK E.M.F.	(V/Krpm)	31
MASS	(Kg)	0.65
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE



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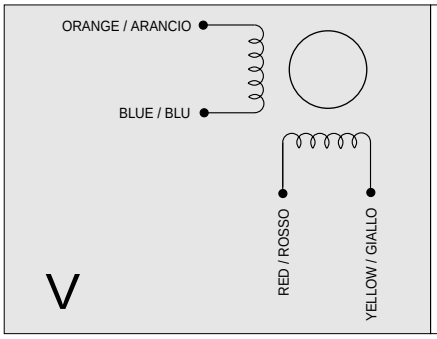
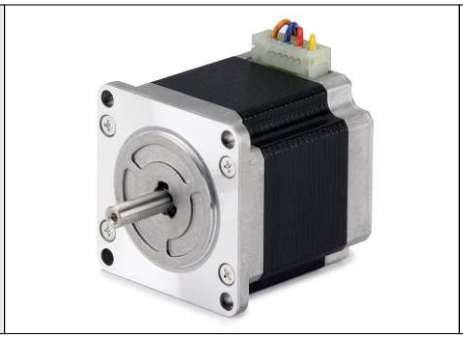
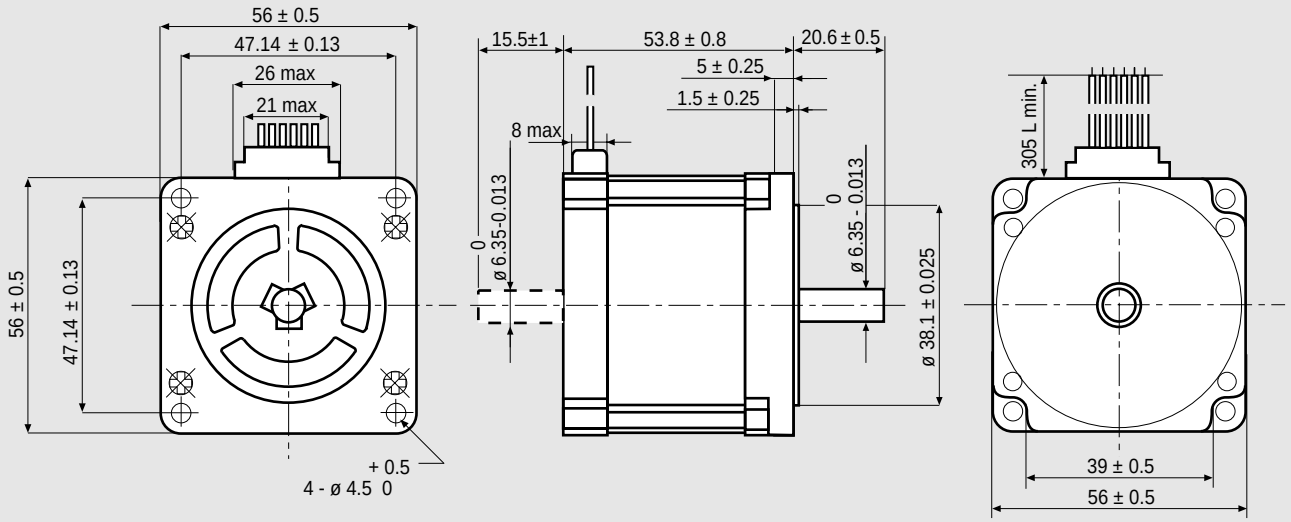




Suggested R.T.A. driver: BSD Series, CSD/A-CSD Series, NDC/A-NDC Series, HGD Series.

Dimensions (Unit:mm)

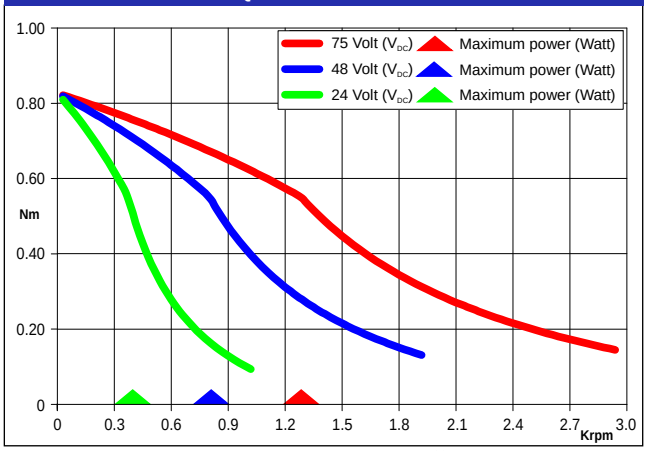


FEATURES

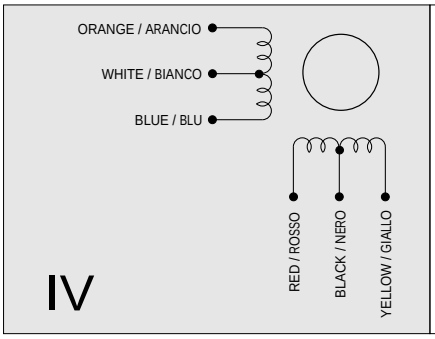
MODEL		103-H7123-0740 (103-H7123-0710)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	2.2(*)
UNIPOLAR CURRENT	(Amp)	3.0
RESISTANCE	(Ohm)	0.77
INDUCTANCE	(mH)	1.6
BIPOLAR HOLDING TORQUE	(Ncm)	110
UNIPOLAR HOLDING TORQUE	(Ncm)	85
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	210
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	50000
BACK E.M.F.	(V/Krpm)	20
MASS	(Kg)	0.65
LEADS CODE		IV

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE



(*)Bipolar series connection.
(*)*Collegamento bipolare serie.*

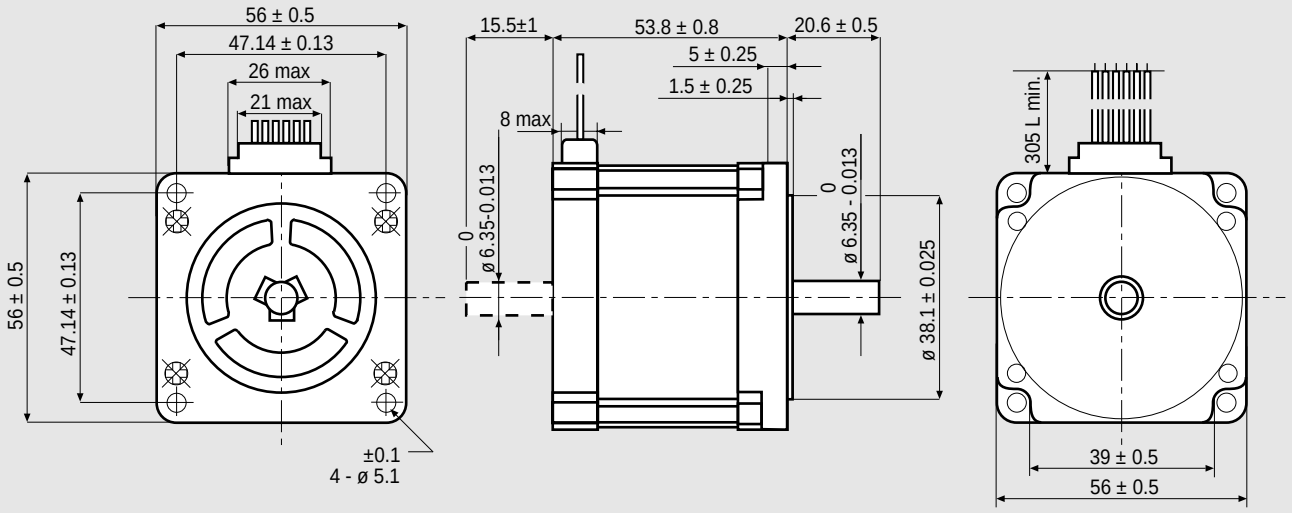


Suggested R.T.A. driver: BSD Series, CSD/A-CSD Series, NDC/A-NDC Series, ADW Series, HGD Series.

103-H7123-1749

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

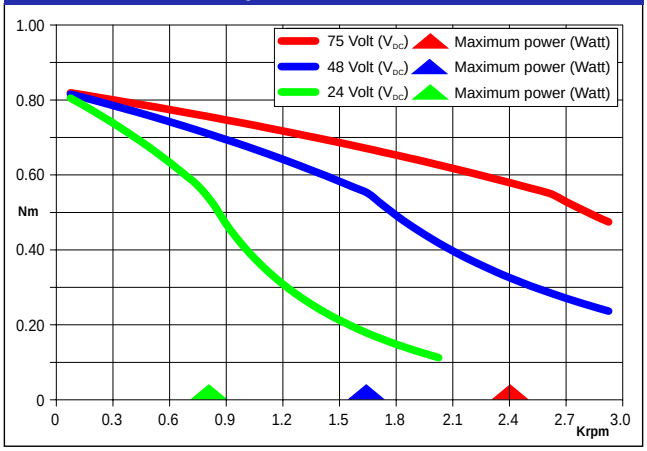


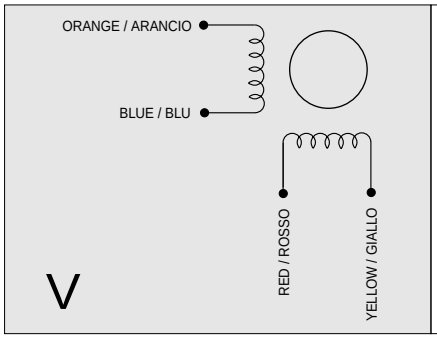
FEATURES

MODEL		103-H7123-1749 (103-H7123-1711)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	4.0
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	0.41
INDUCTANCE	(mH)	1.6
BIPOLAR HOLDING TORQUE	(Ncm)	110
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	210
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	50000
BACK E.M.F.	(V/Krpm)	20
MASS	(Kg)	0.65
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE





Suggested R.T.A. driver: CSD/CSD J/A-CSD Series, NDC/A-NDC Series, ADW Series, HGD Series, PLUS Series.

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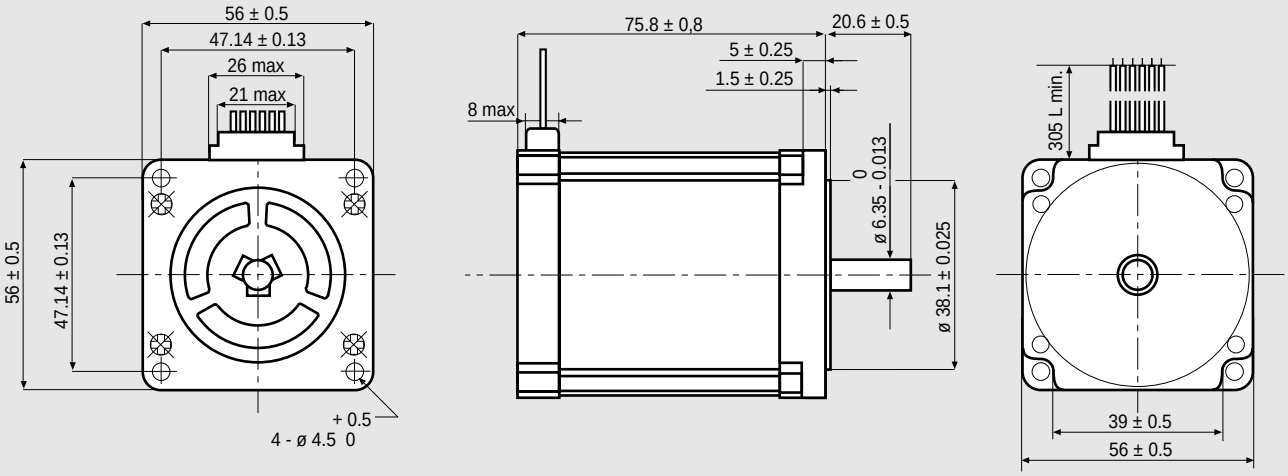
103-H7126-0140

SANYO DENKI
SANMOTION

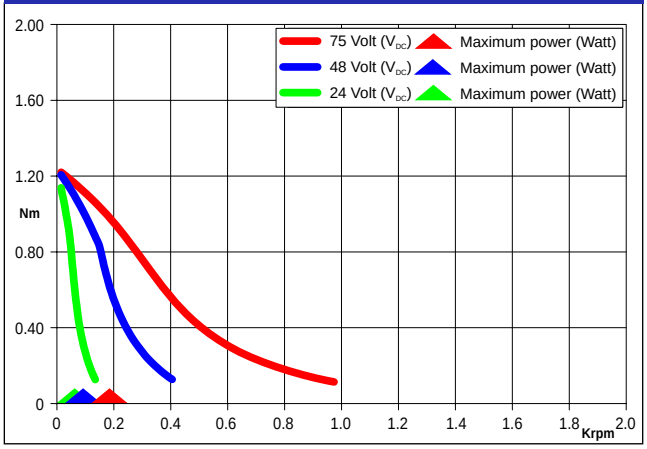
Dimensions (Unit:mm)



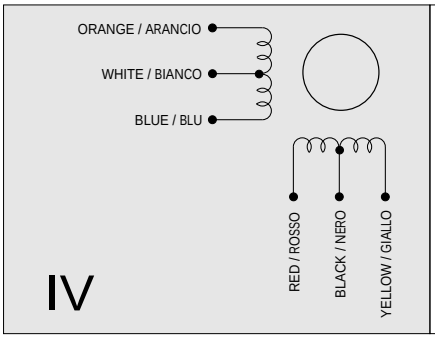
FEATURES

MODEL		103-H7126-0140
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	0.75(*)
UNIPOLAR CURRENT	(Amp)	1.0
RESISTANCE	(Ohm)	8.6
INDUCTANCE	(mH)	19
BIPOLAR HOLDING TORQUE	(Ncm)	165
UNIPOLAR HOLDING TORQUE	(Ncm)	130
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	360
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	45800
BACK E.M.F.	(V/Krpm)	92
MASS	(Kg)	1
LEADS CODE		IV

TORQUE/SPEED CURVE



(*)Bipolar series connection.
(*)*Collegamento bipolare serie.*

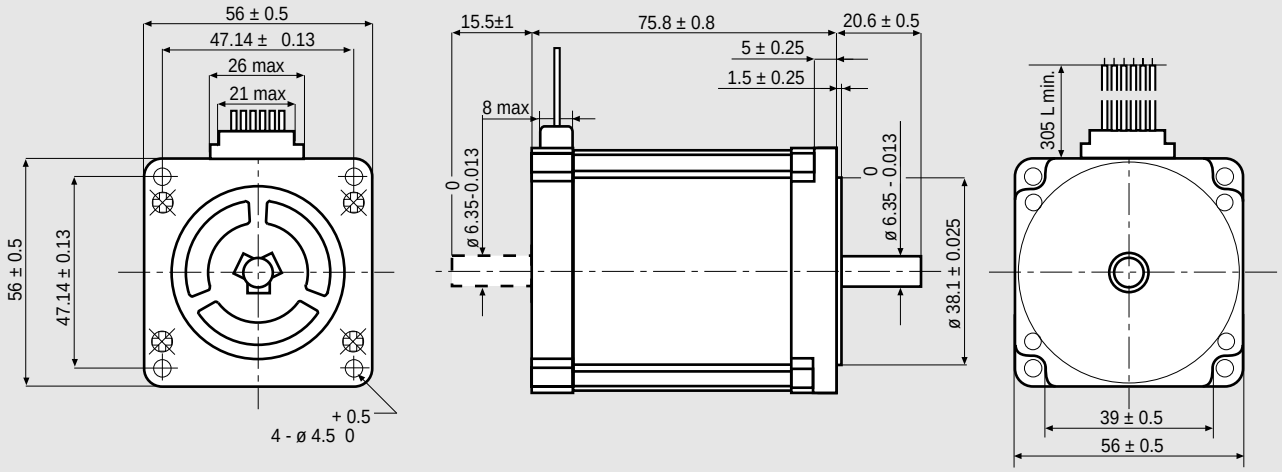


Suggested R.T.A. driver: BSD Series, CSD/A-CSD Series, NDC/A-NDC Series, HGD Series.

103-H7126-0740

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

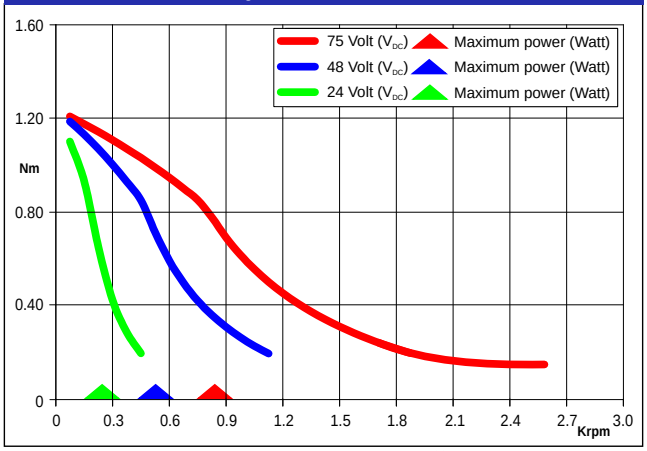


FEATURES

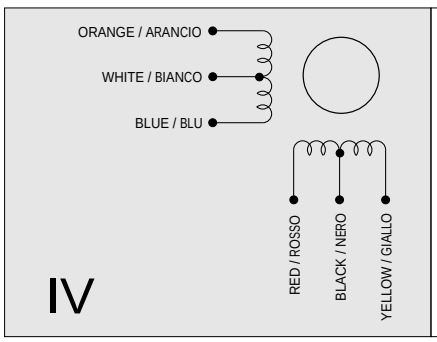
MODEL		103-H7126-0740 (103-H7126-0710)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	2.2 (*)
UNIPOLAR CURRENT	(Amp)	3
RESISTANCE	(Ohm)	0.9
INDUCTANCE	(mH)	2.2
BIPOLAR HOLDING TORQUE	(Ncm)	165
UNIPOLAR HOLDING TORQUE	(Ncm)	130
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	360
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	45800
BACK E.M.F.	(V/Krpm)	31
MASS	(Kg)	1
LEADS CODE		IV

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE



(*)Bipolar series connection.
(*)*Collegamento bipolare serie.*

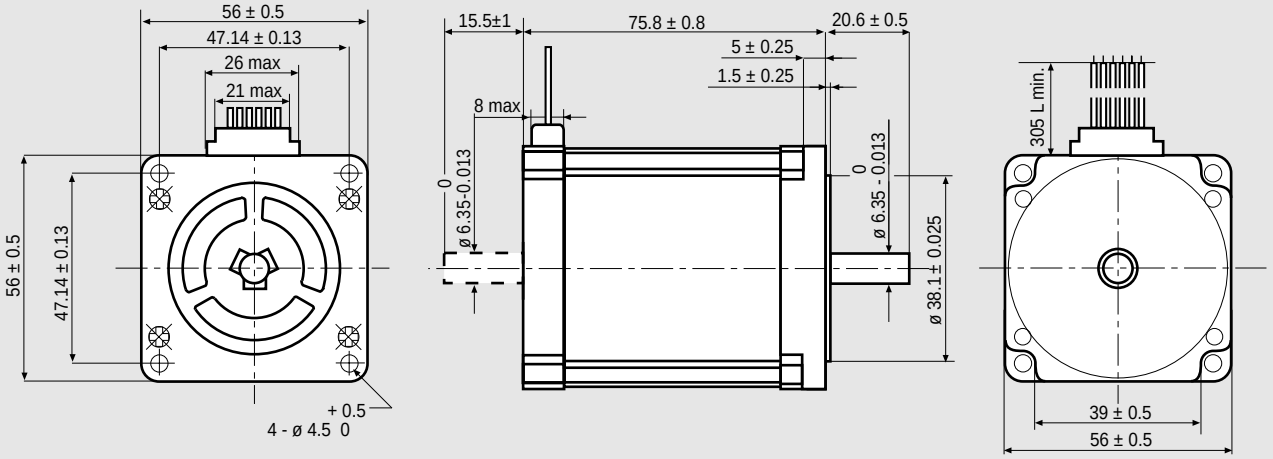


Suggested R.T.A. driver: BSD Series, CSD/A-CSD Series, NDC/A-NDC Series, ADW Series, HGD Series.

103-H7126-1740

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

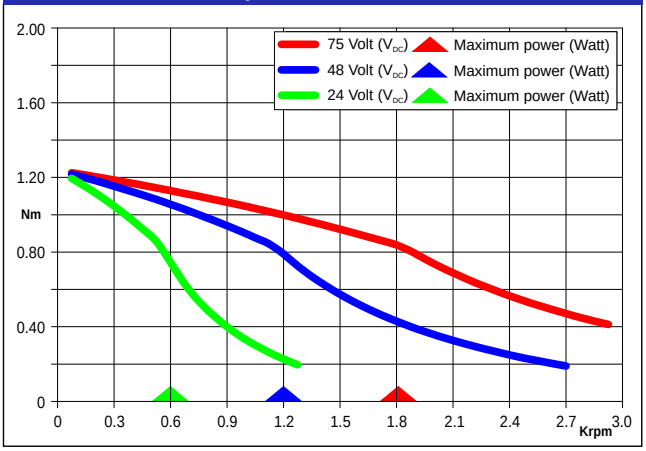


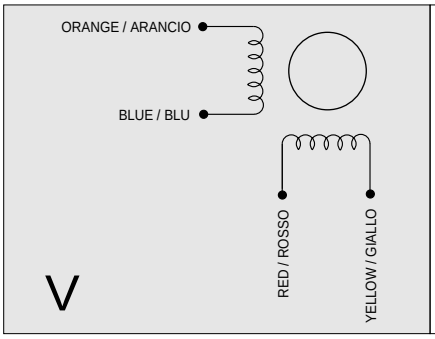
FEATURES

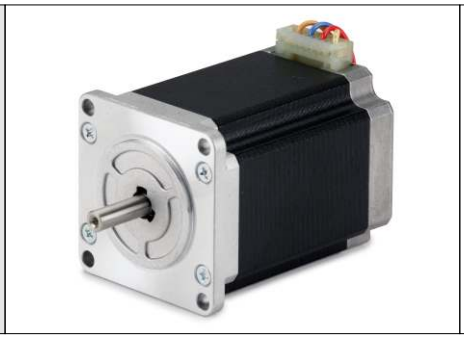
MODEL		103-H7126-1740 (103-H7126-1710)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	4.0
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	0.48
INDUCTANCE	(mH)	2.2
BIPOLAR HOLDING TORQUE	(Ncm)	165
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	360
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	45800
BACK E.M.F.	(V/Krpm)	31
MASS	(Kg)	1
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE





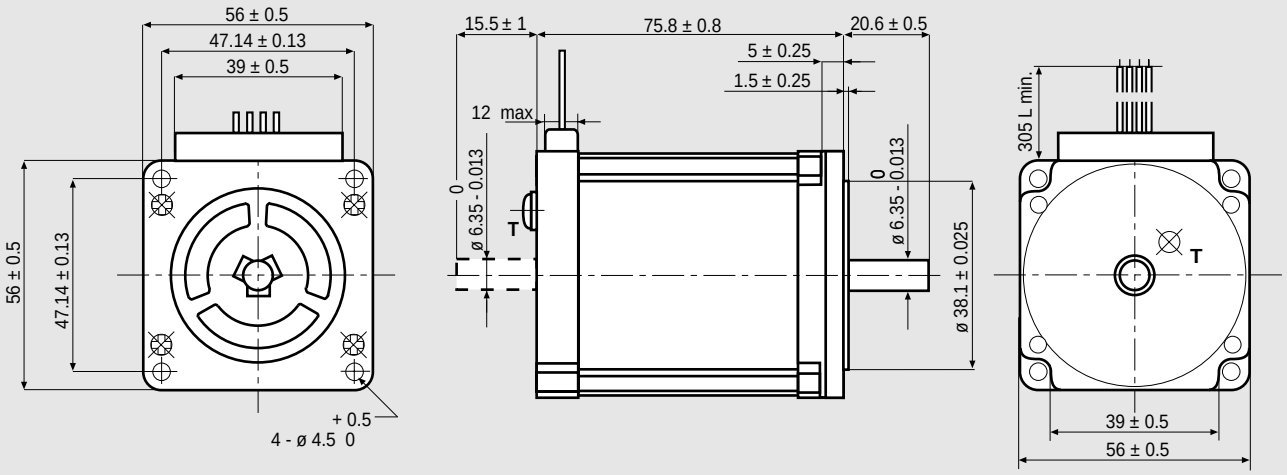


Suggested R.T.A. driver: CSD/CSD J/A-CSD Series, NDC/A-NDC Series, ADW Series, HGD Series, PLUS Series.

103-H7126-6640

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)



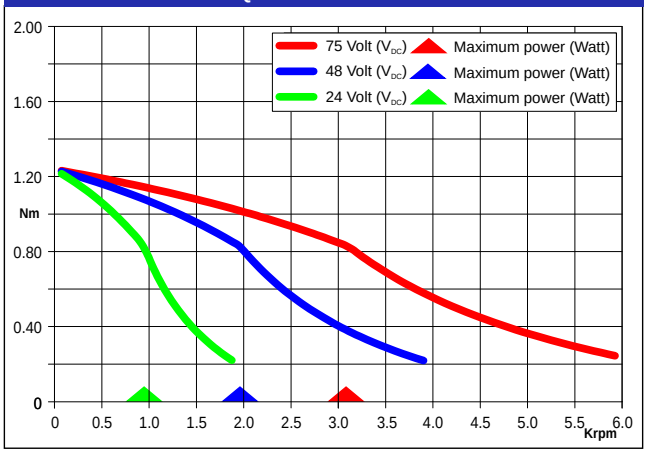
T IS THE EARTH TERMINAL

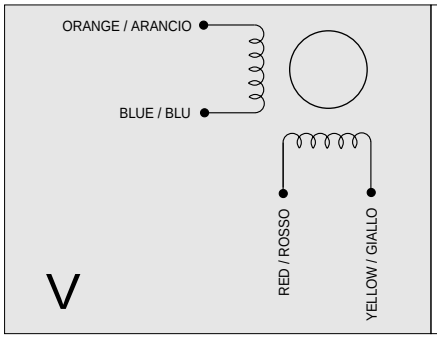
FEATURES

MODEL		103-H7126-6640 (103-H7126-6610)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	5.6
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	0.3
INDUCTANCE	(mH)	0.85
BIPOLAR HOLDING TORQUE	(Ncm)	165
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	360
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	45800
BACK E.M.F.	(V/Krpm)	23
MASS	(Kg)	1
PROTECTION DEGREE		IP43
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE



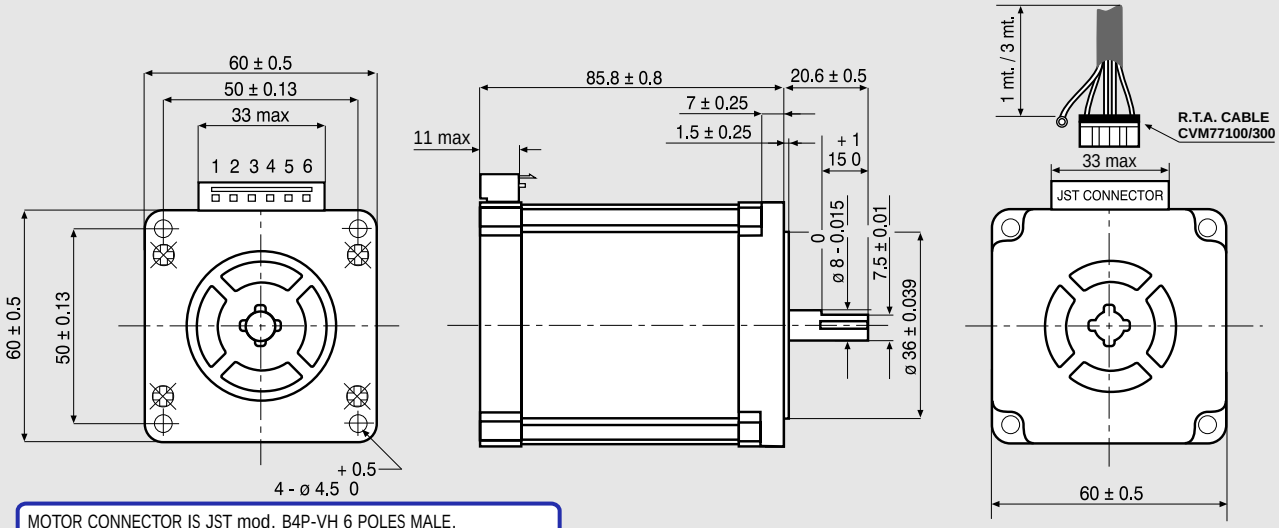


Suggested R.T.A. driver: NDC/A-NDC Series, ADW Series, HGD Series, PLUS Series.

103-H7823-0740

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

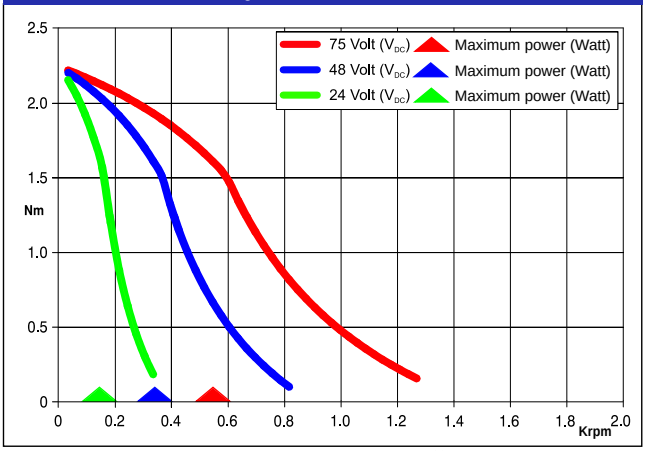


MOTOR CONNECTOR IS JST mod. B4P-VH 6 POLES MALE.
FOR CONNECTION USE JST mod. VHR-6N FEMALE CONNECTOR AND mod. SVH-21 T-P1.1 CONTACTS.
NOTE: 103-H7823-0740 MOTORS NEED CVM77100 AND CVM77300 R.T.A. CABLES. CONTACT R.T.A. FOR FURTHER DETAILS.

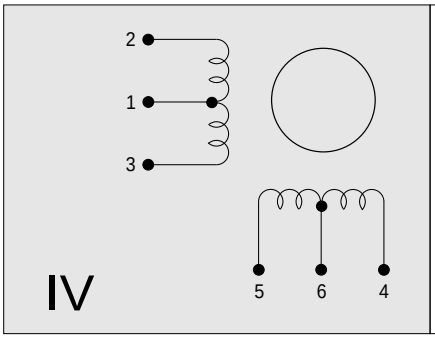
FEATURES

MODEL		103-H7823-0740
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	2.2 (*)
UNIPOLAR CURRENT	(Amp)	3.0
RESISTANCE	(Ohm)	1.25
INDUCTANCE	(mH)	2.4
BIPOLAR HOLDING TORQUE	(Ncm)	300
UNIPOLAR HOLDING TORQUE	(Ncm)	240
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	840
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	35700
BACK E.M.F.	(V/Krpm)	55
MASS	(Kg)	1.4
LEADS CODE		IV

TORQUE/SPEED CURVE



(*)Bipolar series connection.
(*)*Collegamento bipolare serie.*

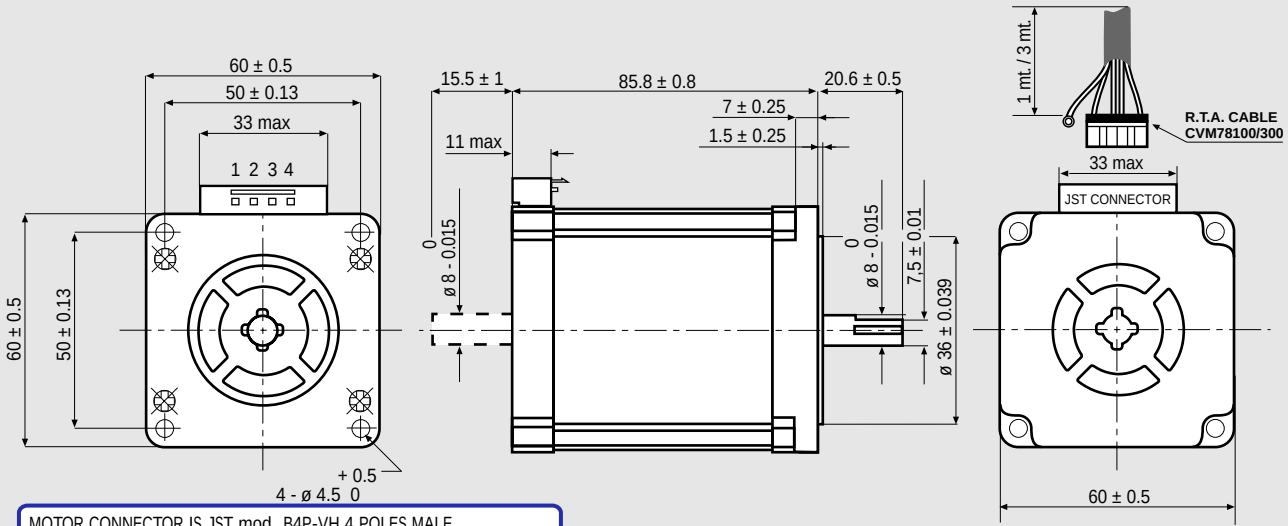


Suggested R.T.A. driver: BSD Series, ADW Series.

103-H7823-1740

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)



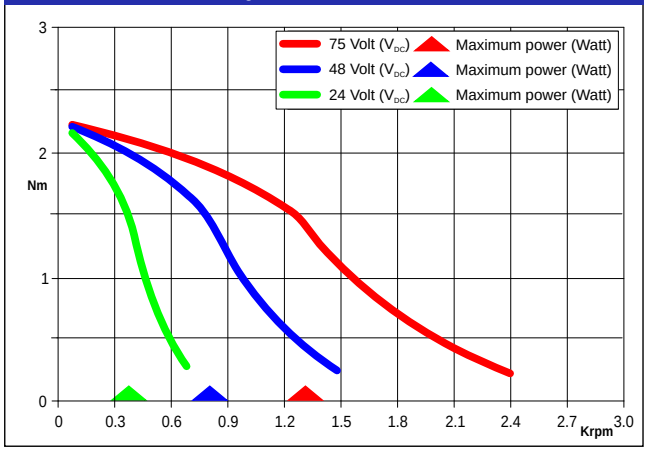
MOTOR CONNECTOR IS JST mod. B4P-VH 4 POLES MALE.
FOR CONNECTION USE JST mod. VHR-4N FEMALE CONNECTOR AND mod. SVH-21 T-P1.1 CONTACTS.
NOTE: 103-H7823-1740 MOTORS NEED CVM78100 AND CVM78300 R.T.A. CABLES. CONTACT R.T.A. FOR FURTHER DETAILS.

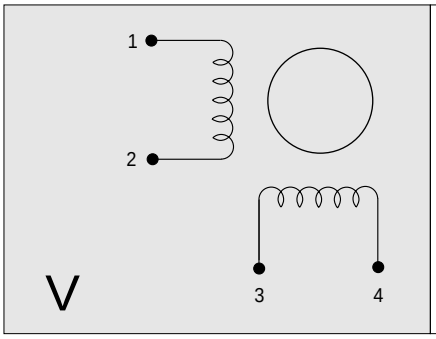
FEATURES

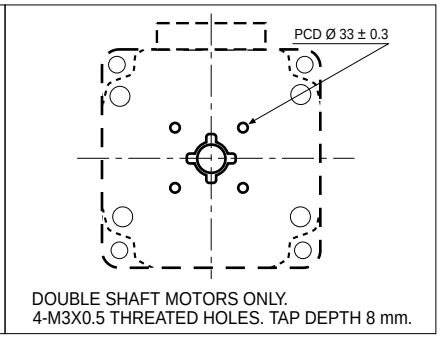
MODEL		103-H7823-1740 (103-H7823-1714)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	4.0
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	0.65
INDUCTANCE	(mH)	2.4
BIPOLAR HOLDING TORQUE	(Ncm)	300
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	840
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	35700
BACK E.M.F.	(V/Krpm)	75
MASS	(Kg)	1.4
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE



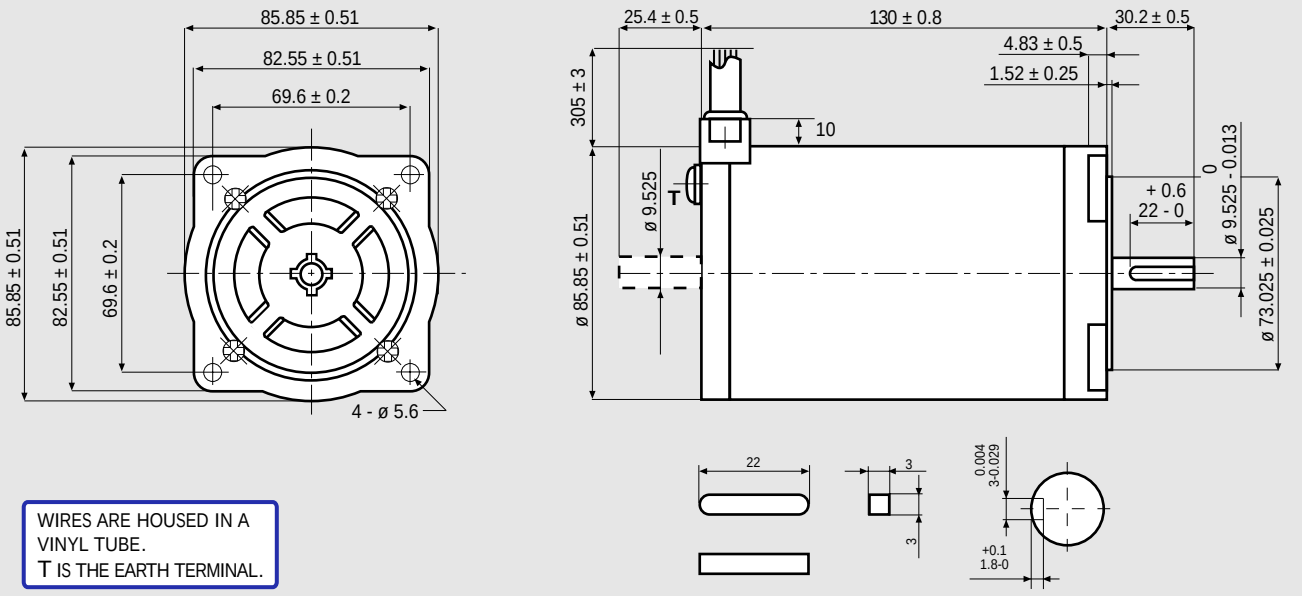




DOUBLE SHAFT MOTORS ONLY.
4-M3X0.5 THREATED HOLES. TAP DEPTH 8 mm.

Suggested R.T.A. driver: CSD/CSD J/A-CSD Series, NDC/A-NDC Series, ADW Series, HGD Series, PLUS Series.

Dimensions (Unit:mm)



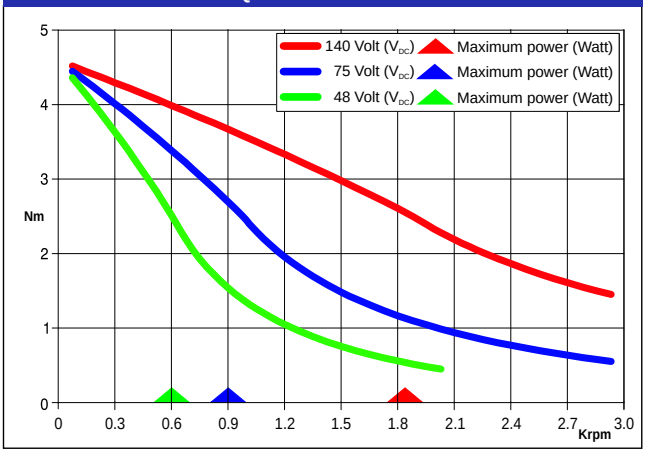
WIRES ARE HOUSED IN A VINYL TUBE.
T IS THE EARTH TERMINAL.

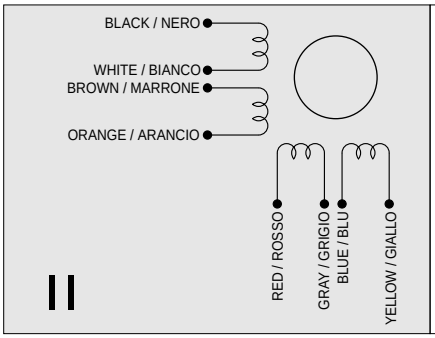
FEATURES

MODEL		103-845-6741 (103-845-6711)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	9.5
UNIPOLAR CURRENT	(Amp)	6.7
RESISTANCE	(Ohm)	0.45
INDUCTANCE	(mH)	2.0
BIPOLAR HOLDING TORQUE	(Ncm)	510
UNIPOLAR HOLDING TORQUE	(Ncm)	410
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	1550
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	32900
BACK E.M.F.	(V/Krpm)	46
MASS	(Kg)	3.6
PROTECTION DEGREE		IP43
LEADS CODE		II

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE





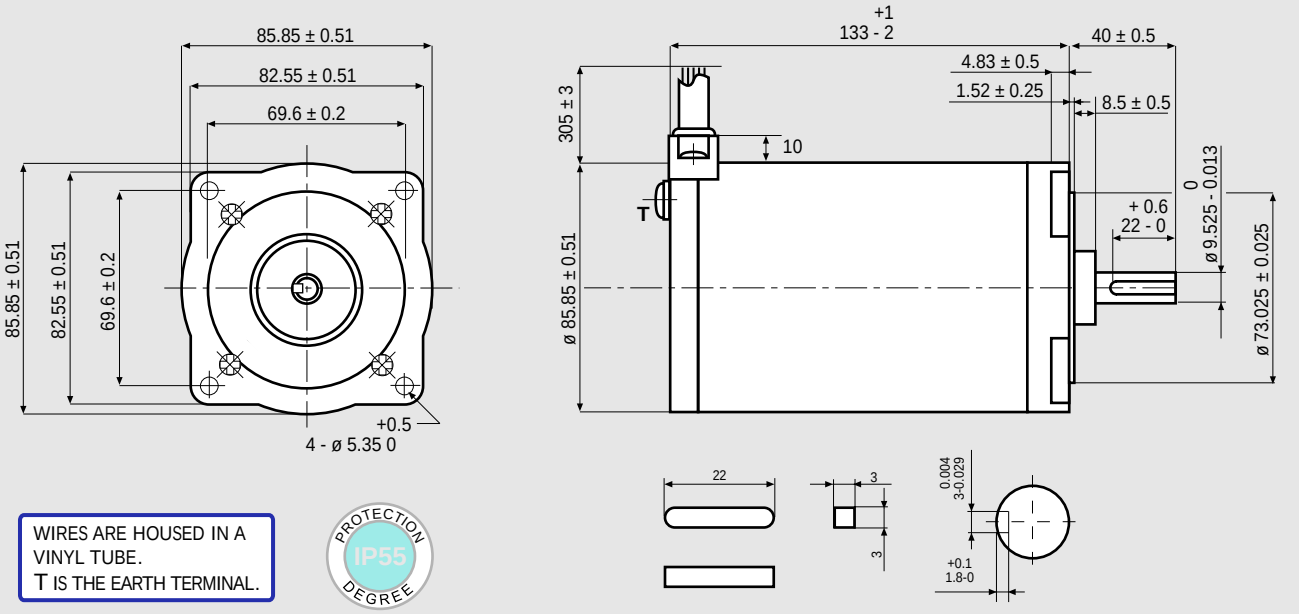
Suggested R.T.A. driver: PLUS Series.

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

103-845-67S1

SANYO DENKI
SANMOTION

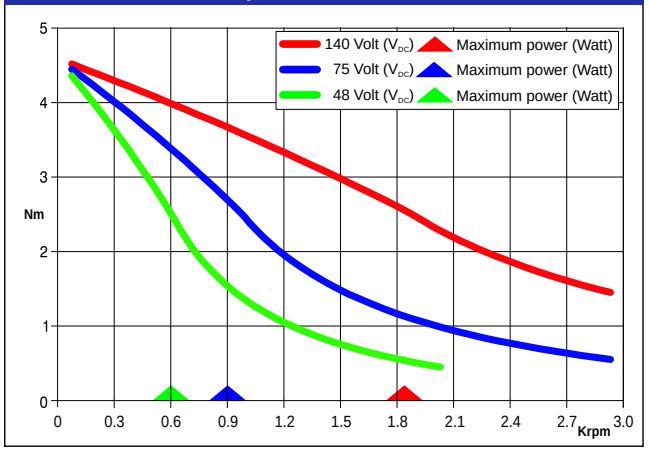
Dimensions (Unit:mm)

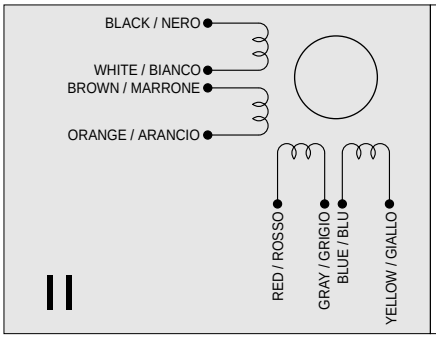


FEATURES

MODEL		103-845-67S1
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	9.5
UNIPOLAR CURRENT	(Amp)	6.7
RESISTANCE	(Ohm)	0.45
INDUCTANCE	(mH)	2.0
BIPOLAR HOLDING TORQUE	(Ncm)	510
UNIPOLAR HOLDING TORQUE	(Ncm)	410
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	1550
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	32900
BACK E.M.F.	(V/Krpm)	46
MASS	(Kg)	3.6
PROTECTION DEGREE		IP55
LEADS CODE		II

TORQUE/SPEED CURVE





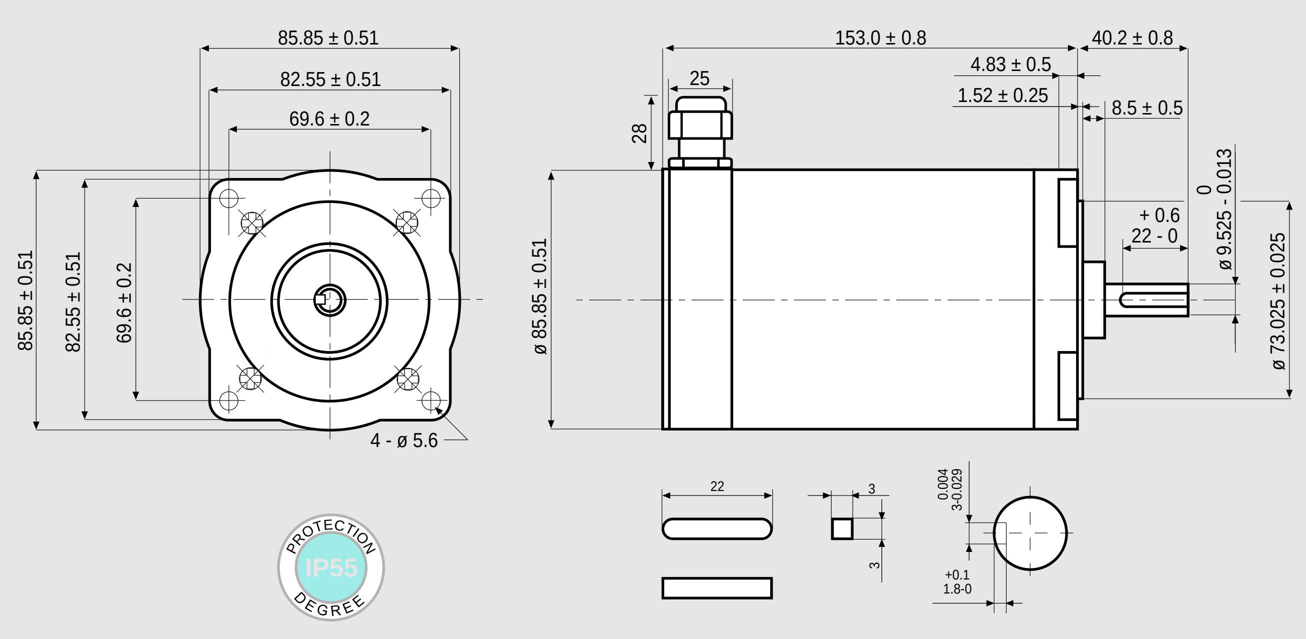
Suggested R.T.A. driver: PLUS Series.

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

103-845-67S41

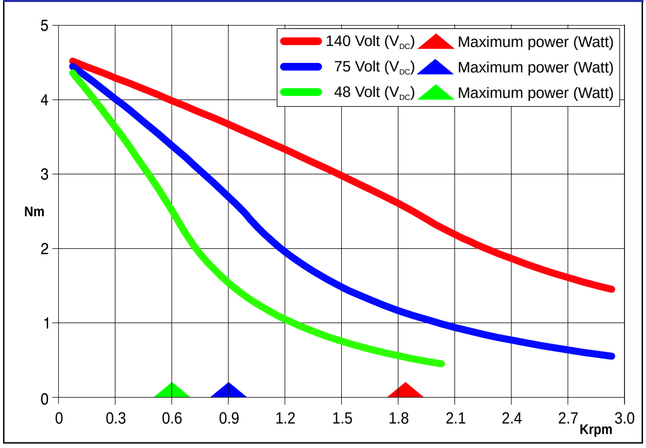
SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

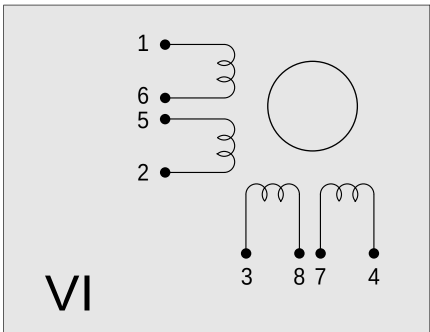


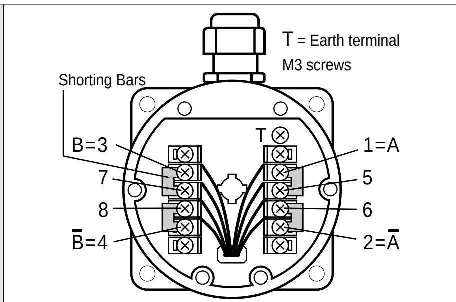
FEATURES		
MODEL		**103-845-67S41**
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	9.5
UNIPOLAR CURRENT	(Amp)	6.7
RESISTANCE	(Ohm)	0.45
INDUCTANCE	(mH)	2.0
BIPOLAR HOLDING TORQUE	(Ncm)	510
UNIPOLAR HOLDING TORQUE	(Ncm)	410
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	1550
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	32900
BACK E.M.F.	(V/Krpm)	46
MASS	(Kg)	3.9
PROTECTION DEGREE		IP55
LEADS CODE		VI

TORQUE/SPEED CURVE

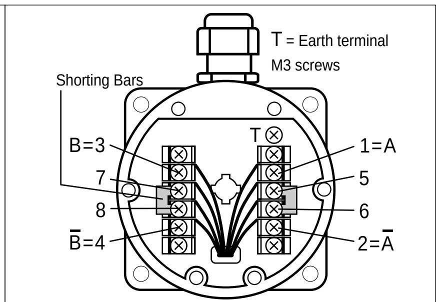


R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)





Terminal box Parallel connection



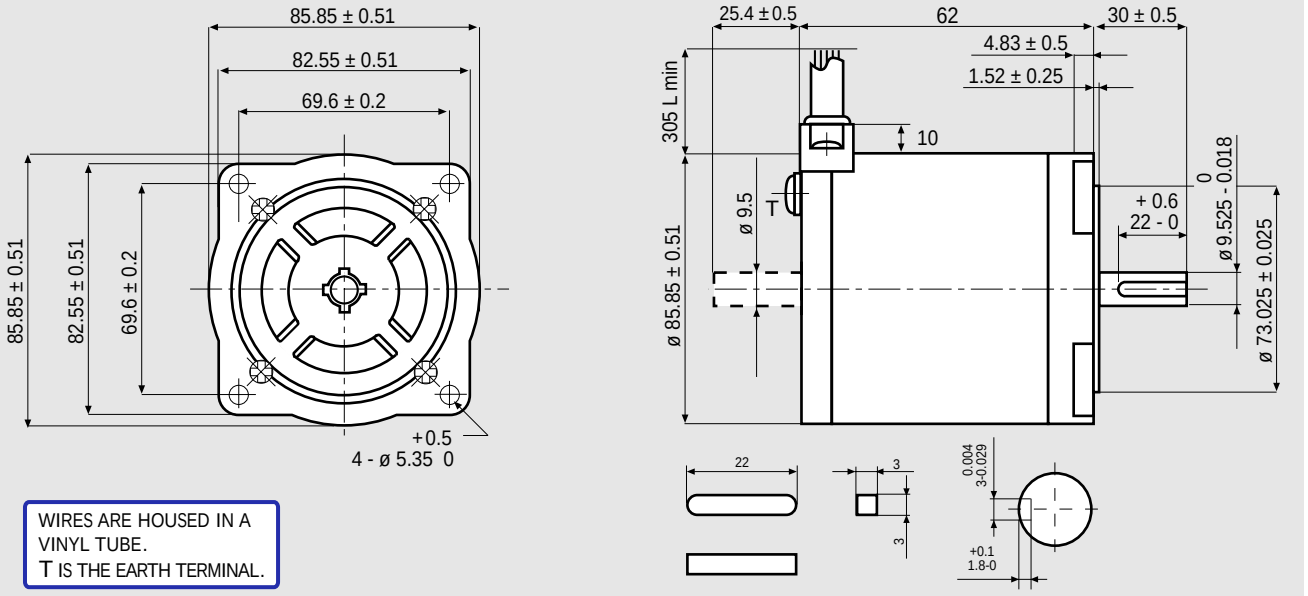
Terminal box Series connection

Suggested R.T.A. driver: PLUS Series.

103-H8221-6241

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)



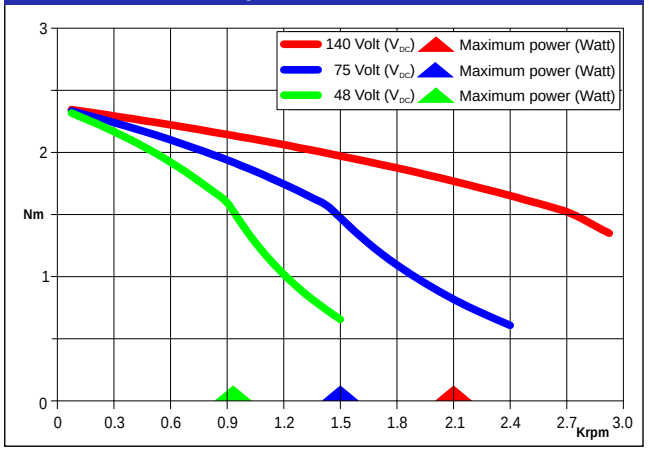
WIRES ARE HOUSED IN A VINYL TUBE.
T IS THE EARTH TERMINAL.

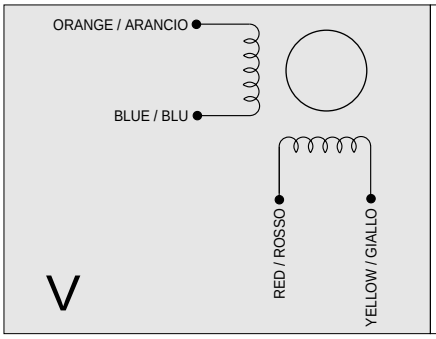
FEATURES

MODEL		103-H8221-6241 (103-H8221-6211)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	6.0
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	0.3
INDUCTANCE	(mH)	1.65
BIPOLAR HOLDING TORQUE	(Ncm)	300
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	1450
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	20600
BACK E.M.F.	(V/Krpm)	50
MASS	(Kg)	1.5
PROTECTION DEGREE		IP43
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE





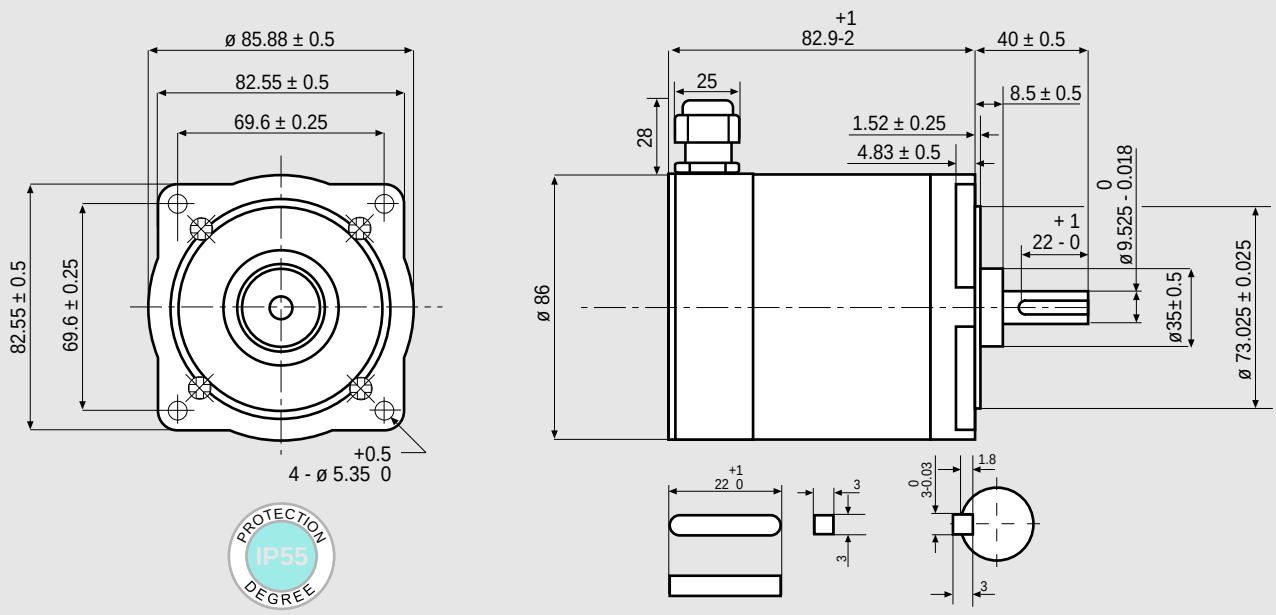
Suggested R.T.A. driver: NDC/A-NDC Series, HGD Series, PLUS Series.

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

103-H8221-62S41

SANYO DENKI
SANMOTION

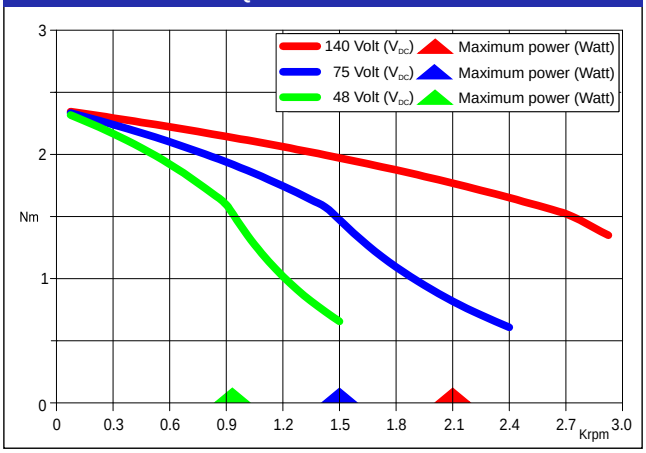
Dimensions (Unit:mm)

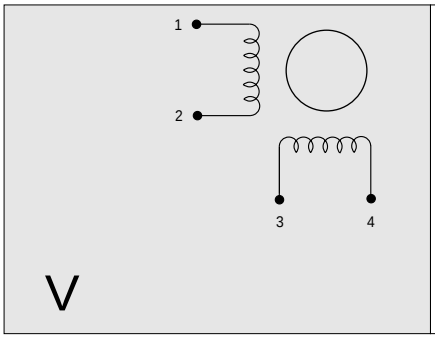


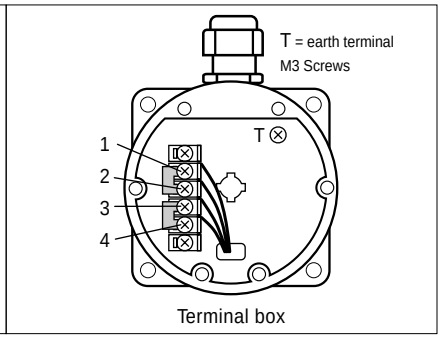
FEATURES

MODEL		103-H8221-62S41
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	6.0
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	0.3
INDUCTANCE	(mH)	1.65
BIPOLAR HOLDING TORQUE	(Ncm)	300
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	1450
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	20600
BACK E.M.F.	(V/Krpm)	50
MASS	(Kg)	1.75
PROTECTION DEGREE		IP55
LEADS CODE		V

TORQUE/SPEED CURVE





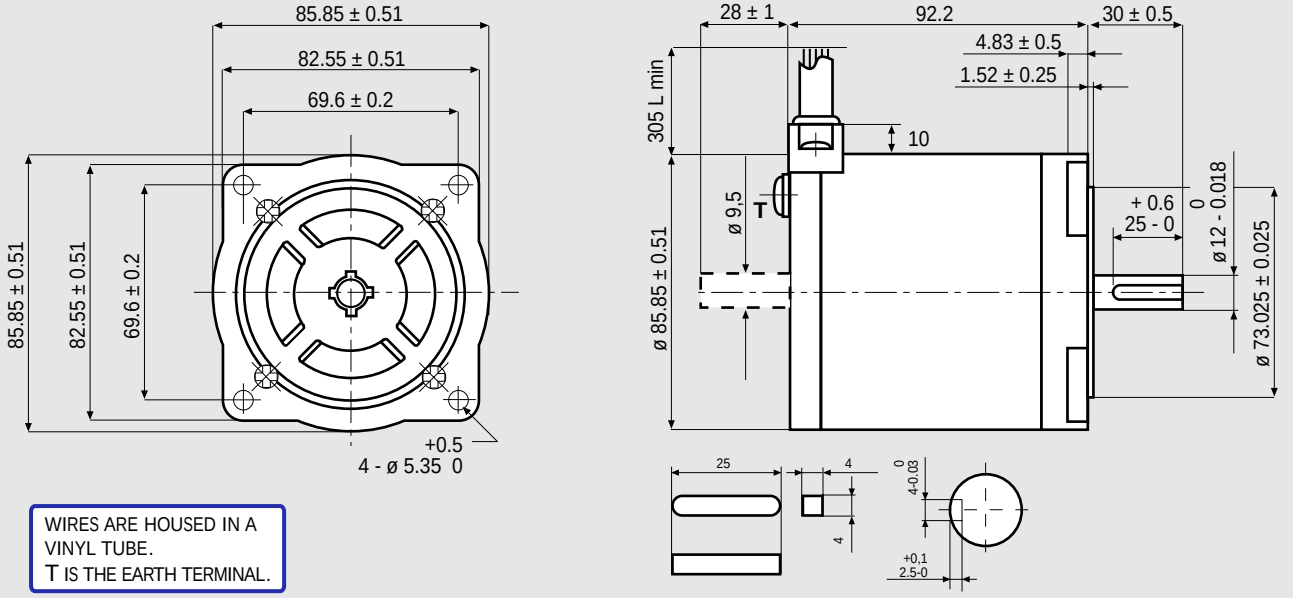


Suggested R.T.A. driver: NDC/A-NDC Series, HGD Series, PLUS Series.

103-H8222-6340

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)



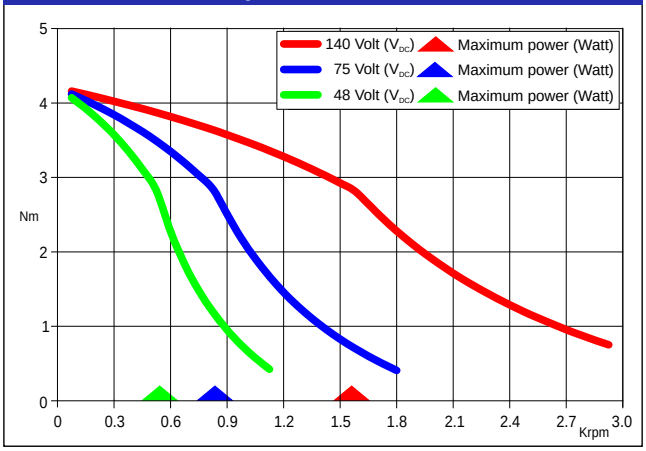
WIRES ARE HOUSED IN A VINYL TUBE.
T IS THE EARTH TERMINAL.

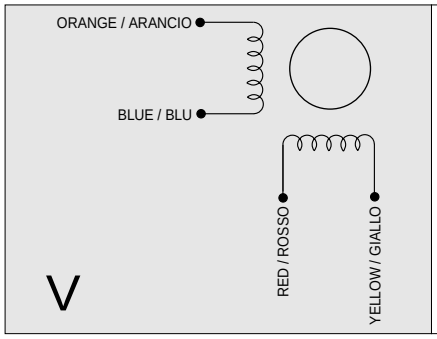
FEATURES

MODEL		103-H8222-6340 (103-H8222-6310)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	6.0
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	0.35
INDUCTANCE	(mH)	2.7
BIPOLAR HOLDING TORQUE	(Ncm)	560
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	($Kgm^2 \times 10^{-7}$)	2900
THEORETICAL ACCELERATION	(rad x $sec.^{-2}$)	19300
BACK E.M.F.	(V/Krpm)	93
MASS	(Kg)	2.5
PROTECTION DEGREE		IP43
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

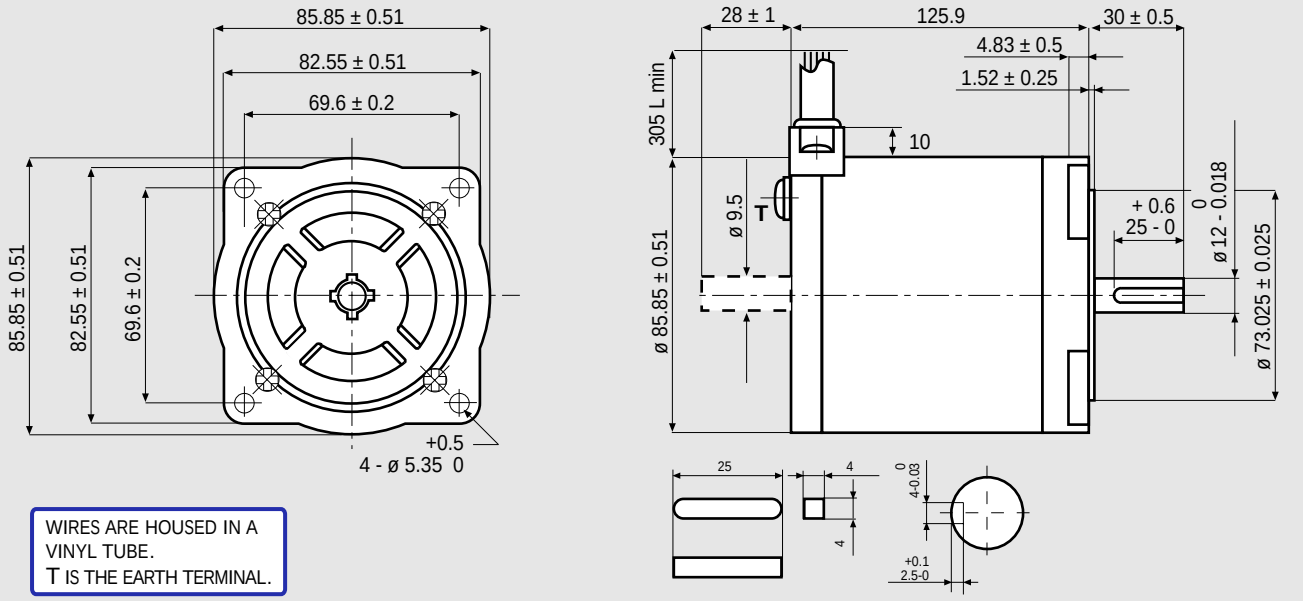
TORQUE/SPEED CURVE





Suggested R.T.A. driver: NDC/A-NDC Series, HGD Series, PLUS Series.

Dimensions (Unit:mm)



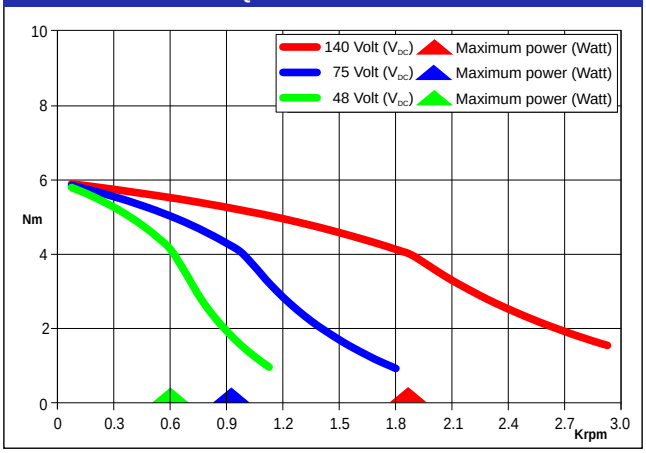
WIRES ARE HOUSED IN A VINYL TUBE.
T IS THE EARTH TERMINAL.

FEATURES

MODEL		103-H8223-6540 (103-H8223-6510)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	9.0
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	0.2
INDUCTANCE	(mH)	1.4
BIPOLAR HOLDING TORQUE	(Ncm)	790
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	4350
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	18200
BACK E.M.F.	(V/Krpm)	88
MASS	(Kg)	3.5
PROTECTION DEGREE		IP43
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE

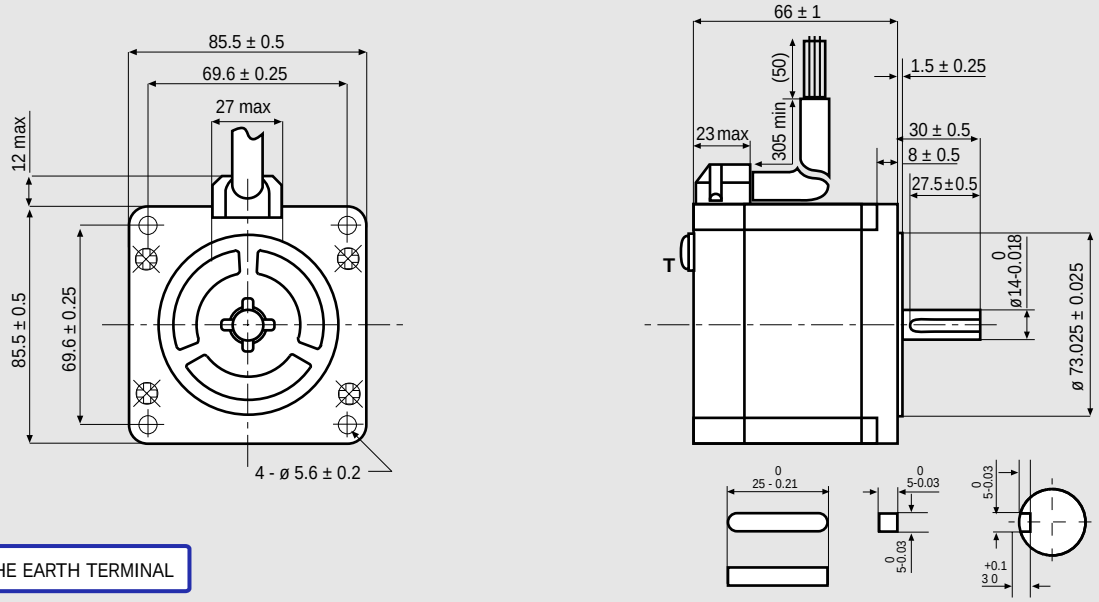


Suggested R.T.A. driver: PLUS Series.

SM 2861-5055

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)



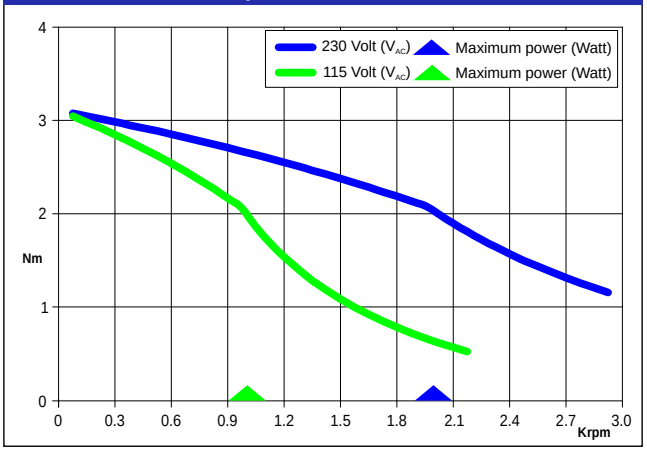
T IS THE EARTH TERMINAL

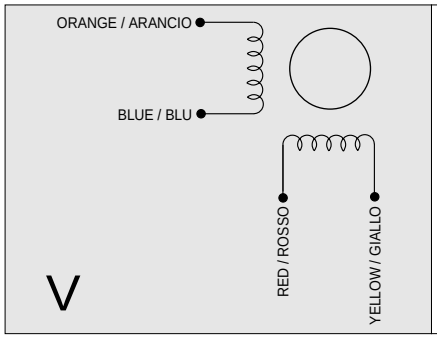
FEATURES

MODEL		SM 2861-5055 (SM 2861-5025)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	2.0
RESISTANCE	(Ohm)	2.2
INDUCTANCE	(mH)	15
BIPOLAR HOLDING TORQUE	(Ncm)	360
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	1480
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	24300
BACK E.M.F.	(V/Krpm)	180
MASS	(Kg)	1.7
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE		IP43-F
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE

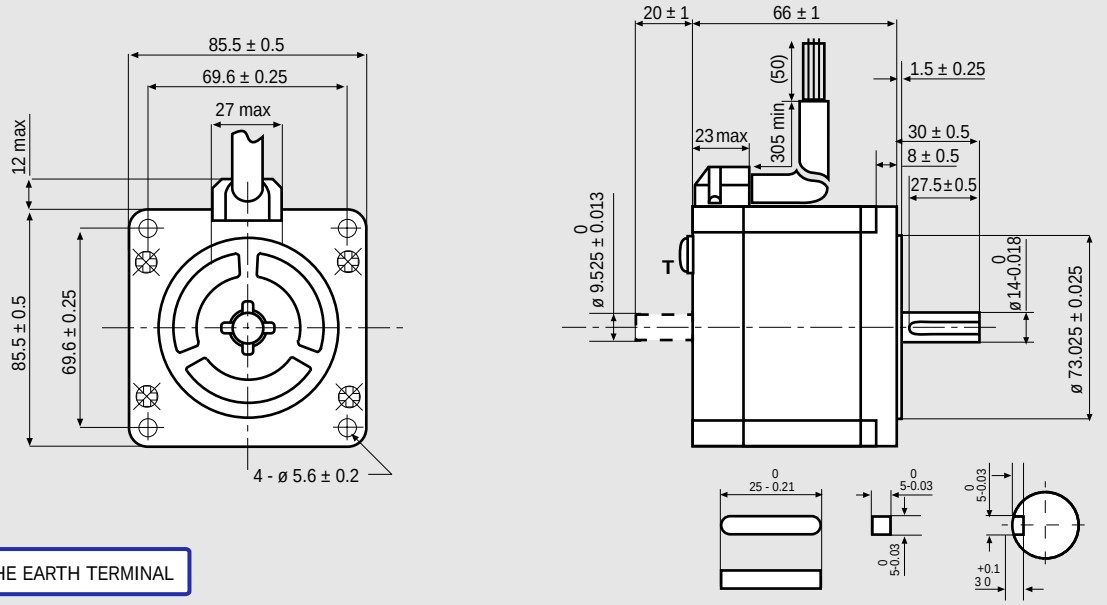




Suggested R.T.A. driver: X-PLUS B Series, X-MIND Series.

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

Dimensions (Unit:mm)



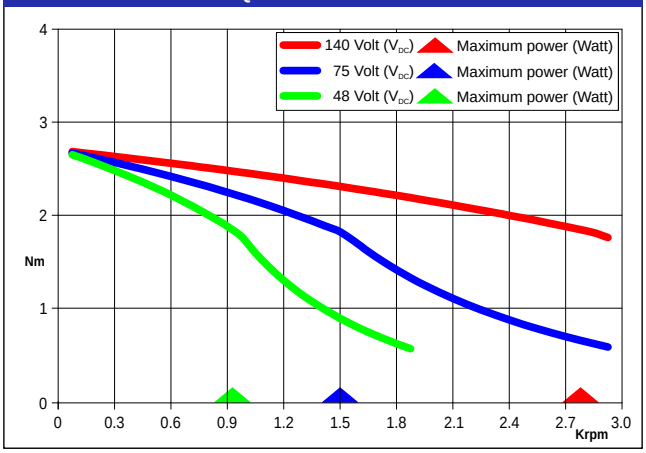
T IS THE EARTH TERMINAL

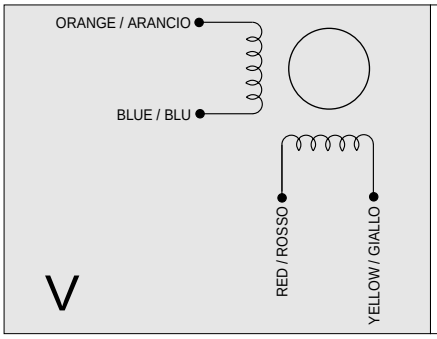
FEATURES

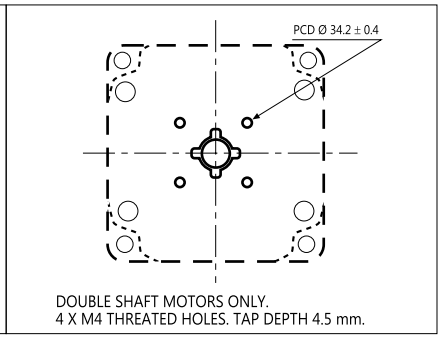
MODEL		SM 2861-5255 (SM 2861-5225)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	6.0
RESISTANCE	(Ohm)	0.29
INDUCTANCE	(mH)	1.7
BIPOLAR HOLDING TORQUE	(Ncm)	360
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	1480
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	24300
BACK E.M.F.	(V/Krpm)	60
MASS	(Kg)	1.7
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE		IP43-F
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE





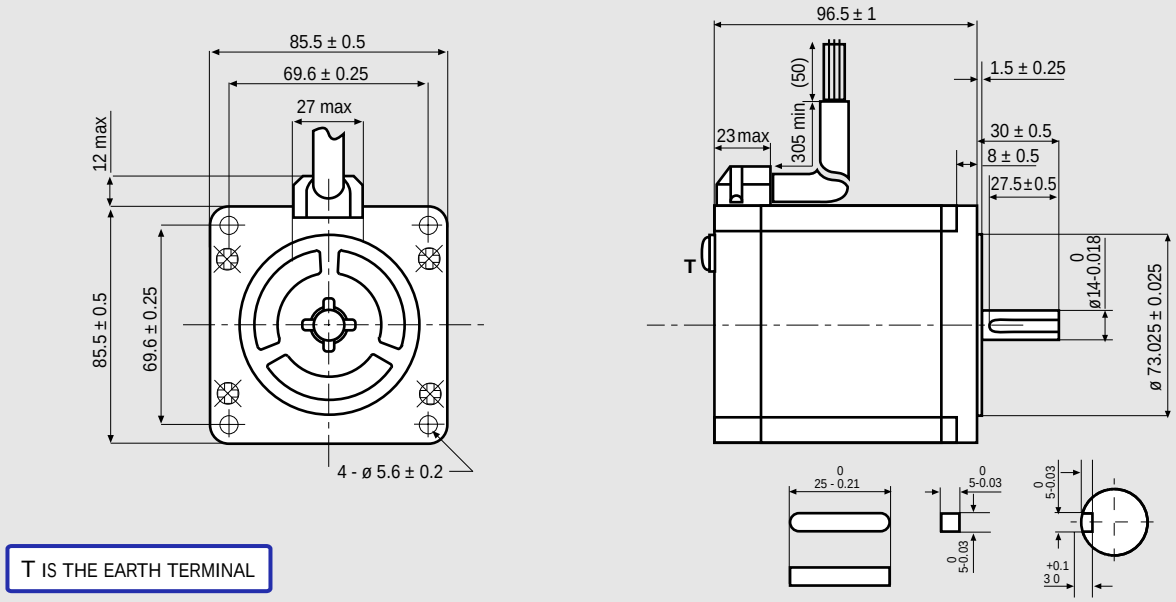


Suggested R.T.A. driver: NDC/A-NDC Series, ADW Series, HGD Series, PLUS Series.

SM 2862-5055

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

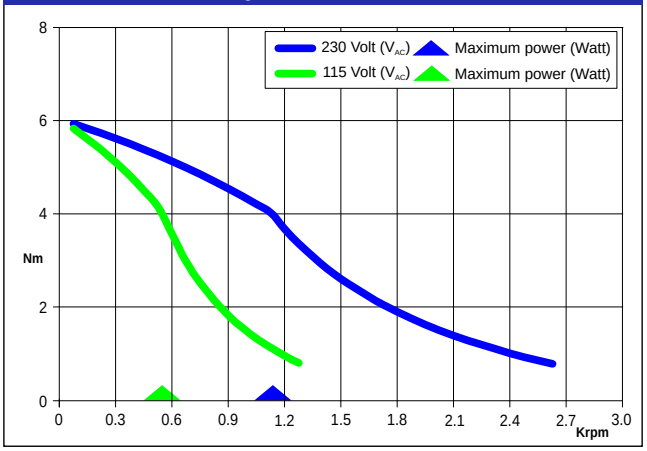


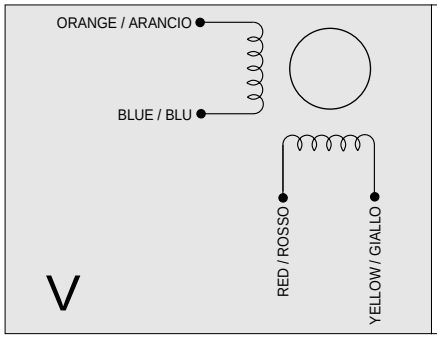
T IS THE EARTH TERMINAL

FEATURES

MODEL		SM 2862-5055
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	2.0
RESISTANCE	(Ohm)	3.2
INDUCTANCE	(mH)	25
BIPOLAR HOLDING TORQUE	(Ncm)	700
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	3000
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	23300
BACK E.M.F.	(V/Krpm)	350
MASS	(Kg)	2.9
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE		IP43-F
LEADS CODE		V

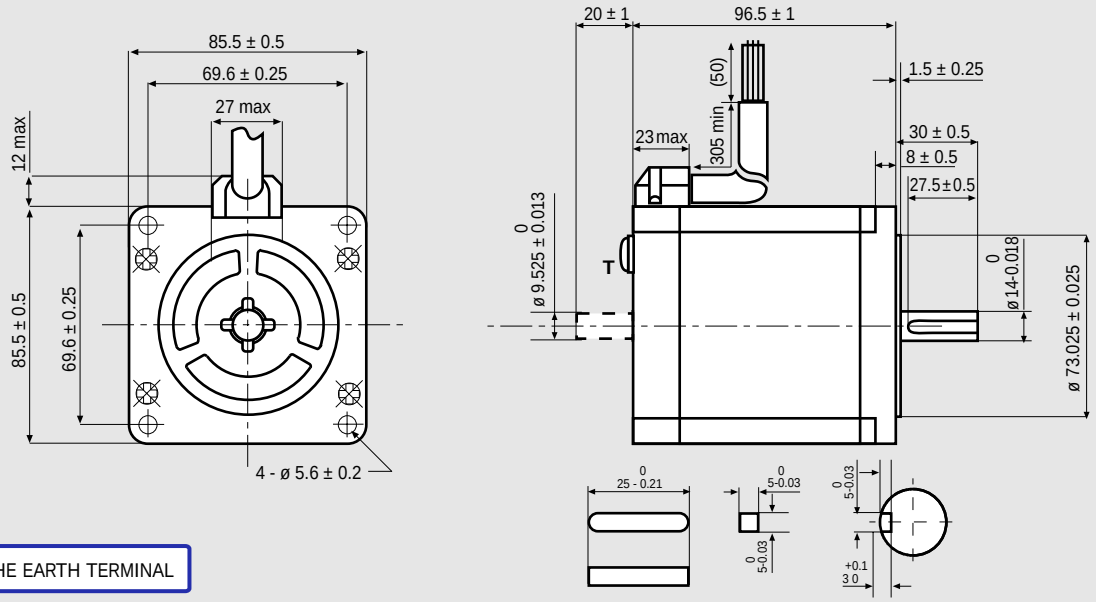
TORQUE/SPEED CURVE





Suggested R.T.A. driver: X-PLUS B Series, X-MIND Series.

Dimensions (Unit:mm)



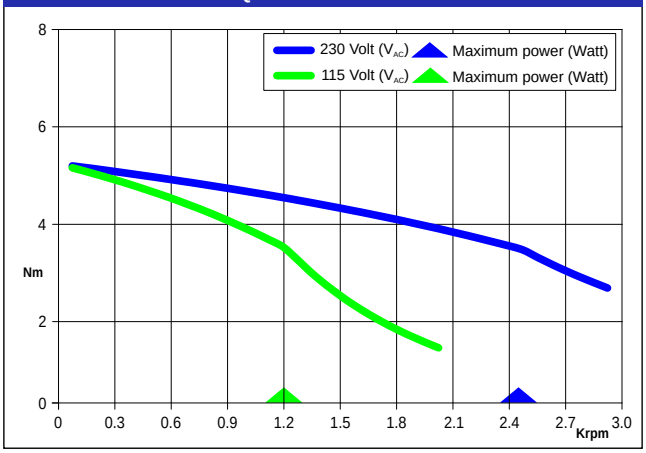
T IS THE EARTH TERMINAL

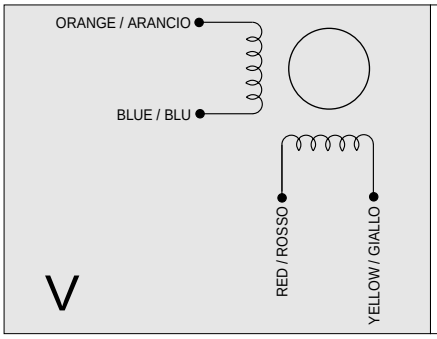
FEATURES

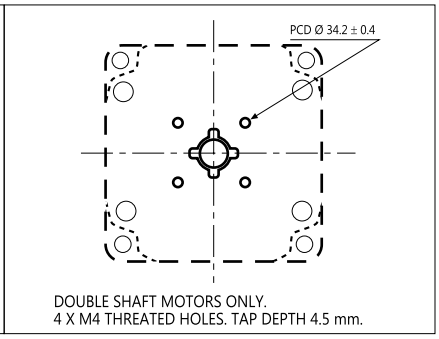
MODEL		SM 2862-5155 (SM 2862-5125)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	4.0
RESISTANCE	(Ohm)	0.83
INDUCTANCE	(mH)	6.4
BIPOLAR HOLDING TORQUE	(Ncm)	700
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	3000
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	23300
BACK E.M.F.	(V/Krpm)	175
MASS	(Kg)	2.9
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE		IP43-F
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE







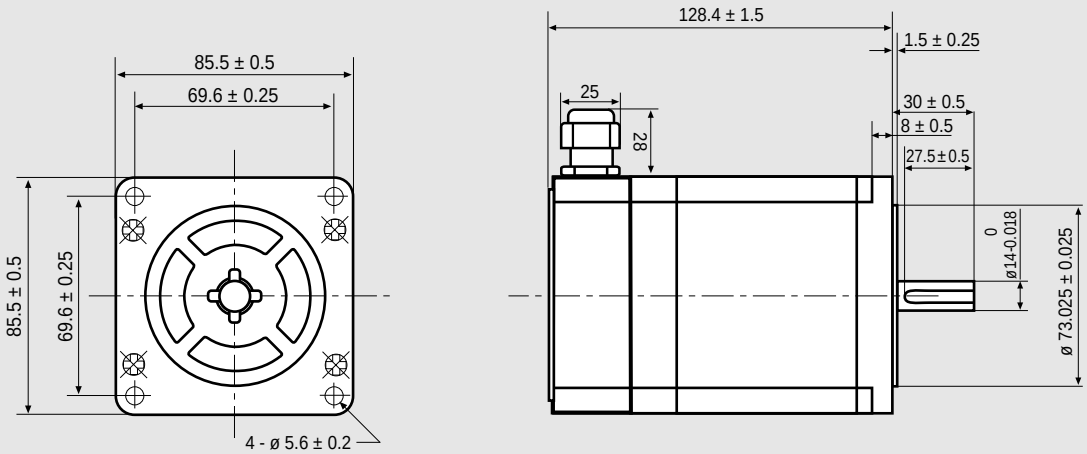
Suggested R.T.A. driver: X-PLUS B Series, X-MIND Series.

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

SM 2862-5156

SANYO DENKI
SANMOTION

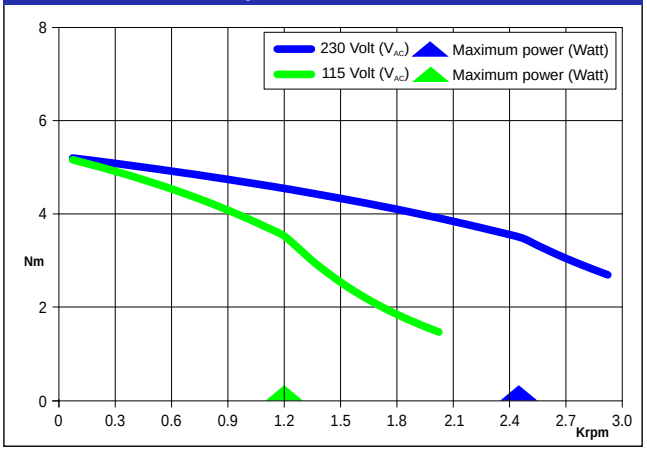
Dimensions (Unit:mm)

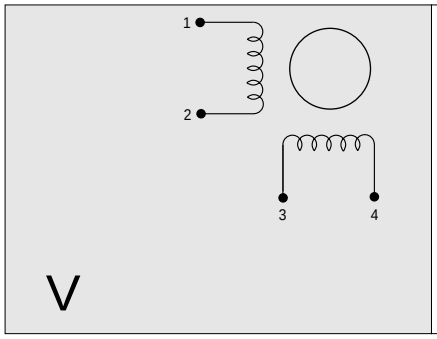


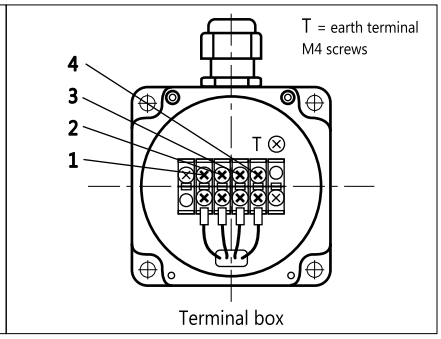
FEATURES

MODEL		SM 2862-5156
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	4.0
RESISTANCE	(Ohm)	0.83
INDUCTANCE	(mH)	6.4
BIPOLAR HOLDING TORQUE	(Ncm)	700
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	3000
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	23300
BACK E.M.F.	(V/Krpm)	175
MASS	(Kg)	2.9
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE		IP43-F
LEADS CODE		V

TORQUE/SPEED CURVE

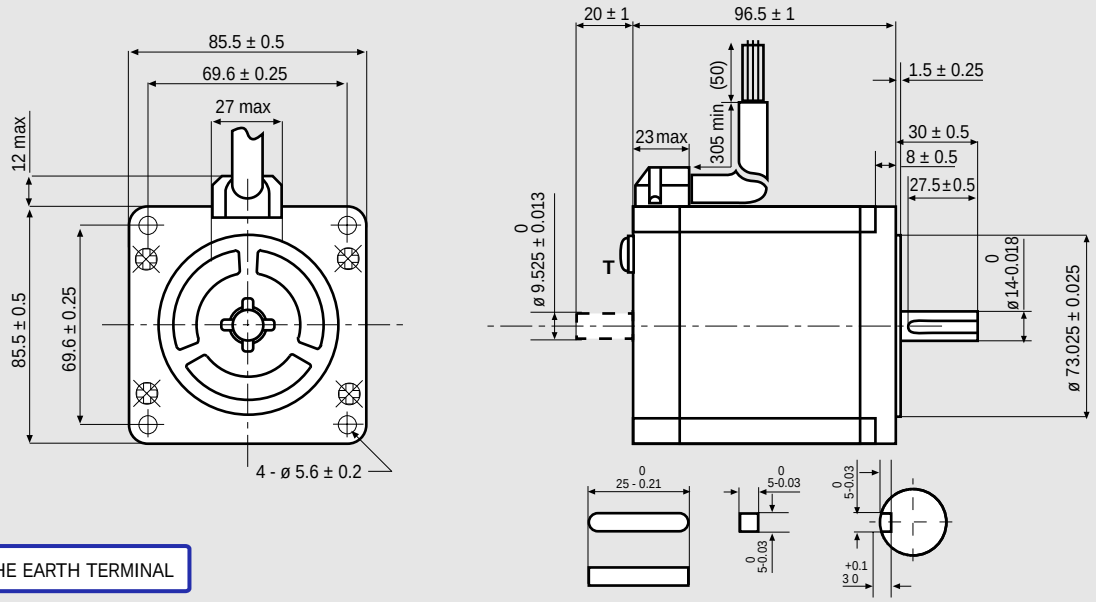






Suggested R.T.A. driver: X-PLUS B Series, X-MIND Series.

Dimensions (Unit:mm)



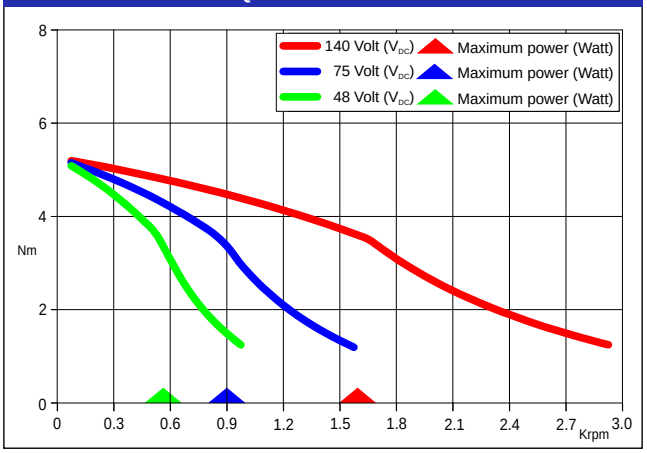
T IS THE EARTH TERMINAL

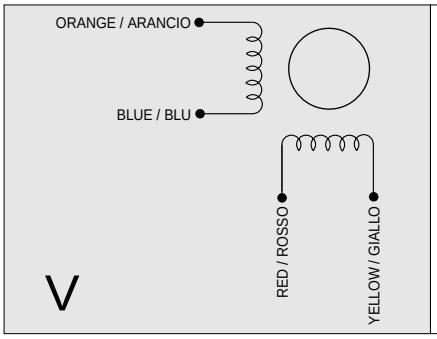
FEATURES

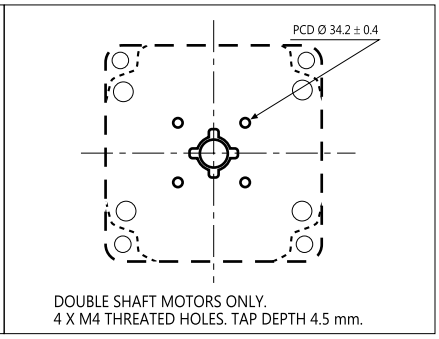
MODEL		SM 2862-5255 (SM 2862-5225)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	6.0
RESISTANCE	(Ohm)	0.36
INDUCTANCE	(mH)	2.8
BIPOLAR HOLDING TORQUE	(Ncm)	700
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	3000
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	23300
BACK E.M.F.	(V/Krpm)	120
MASS	(Kg)	2.9
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE		IP43-F
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE







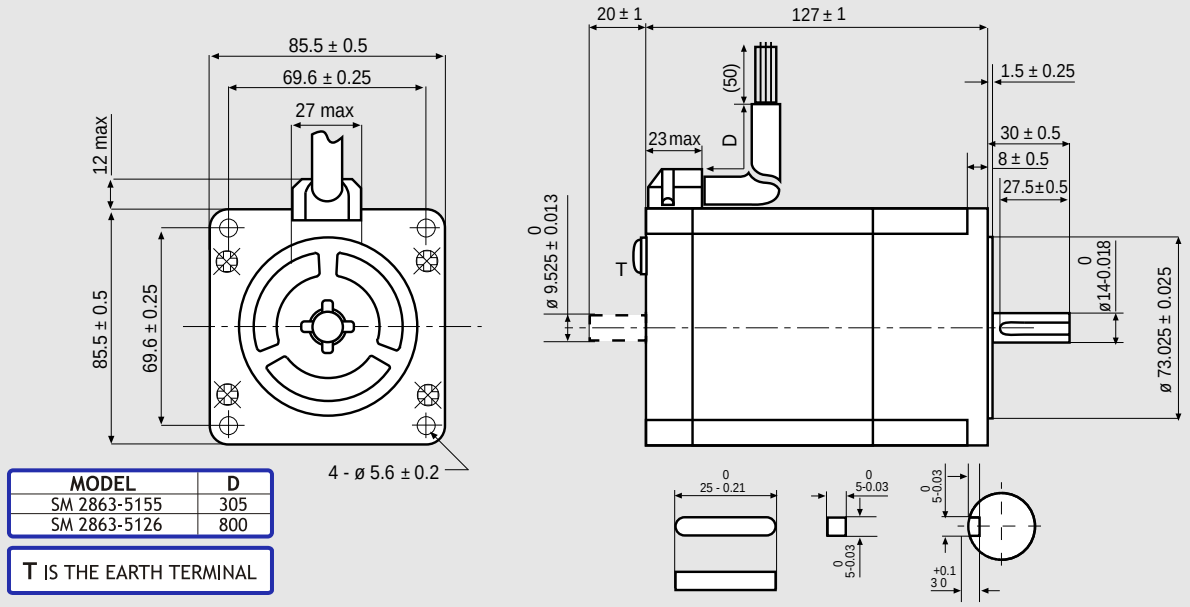
Suggested R.T.A. driver: NDC/A-NDC Series, ADW Series, HGD Series, PLUS Series.

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

SM 2863-5155

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)



MODEL	D
SM 2863-5155	305
SM 2863-5126	800

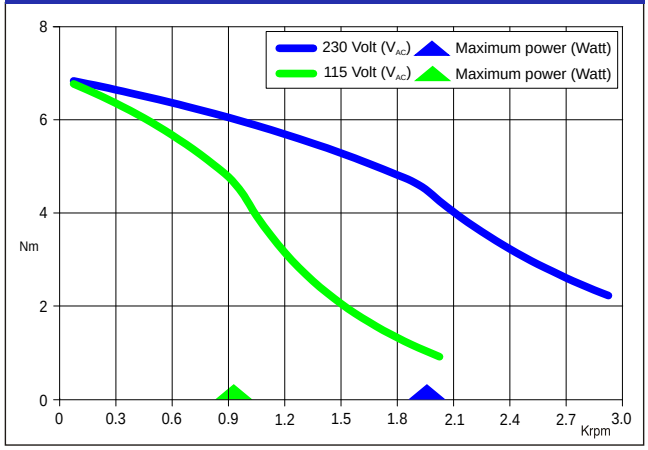
T IS THE EARTH TERMINAL

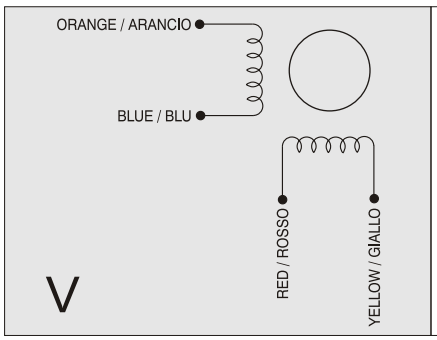
FEATURES

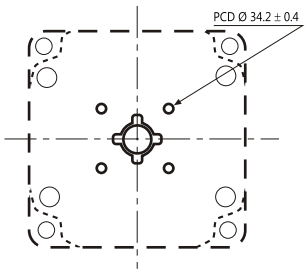
MODEL		SM 2863-5155 (SM 2863-5126)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	4.0
RESISTANCE	(Ohm)	1.0
INDUCTANCE	(mH)	7.9
BIPOLAR HOLDING TORQUE	(Ncm)	920
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	4500
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	20500
BACK E.M.F.	(V/Krpm)	241
MASS	(Kg)	4
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE		IP43-F
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE



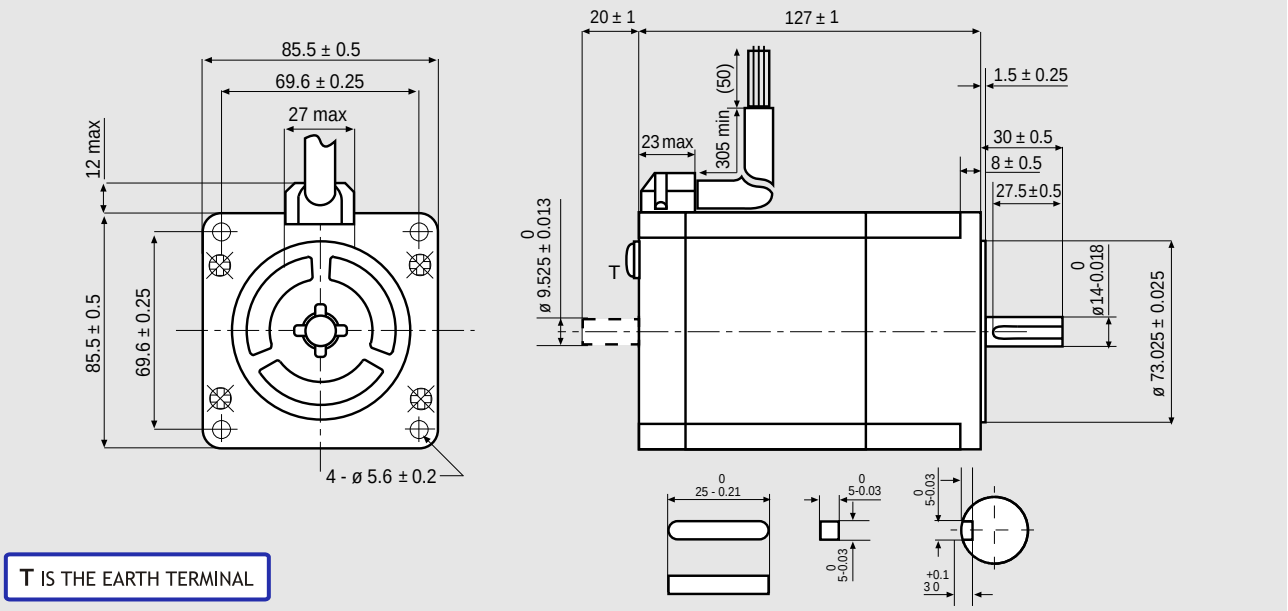




DOUBLE SHAFT MOTORS ONLY.
4 X M4 THREATED HOLES. TAP DEPTH 4.5 mm.

Suggested R.T.A. driver: X-PLUS B Series, X-MIND Series.

Dimensions (Unit:mm)



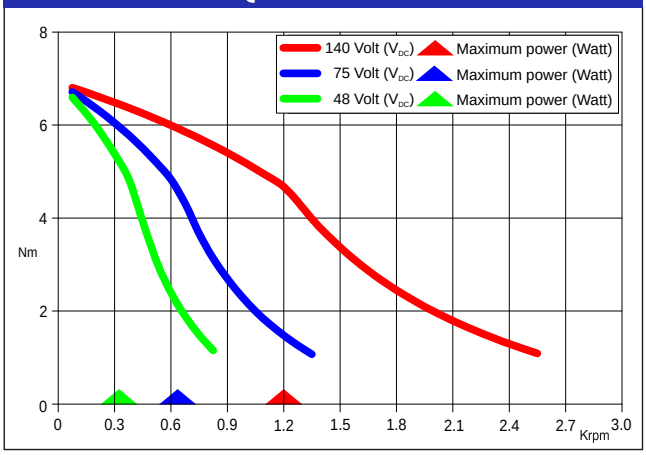
T IS THE EARTH TERMINAL

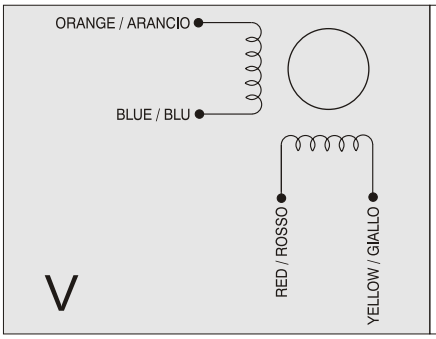
FEATURES

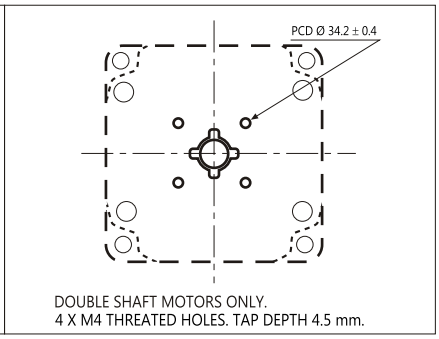
MODEL		SM 2863-5255 (SM 2863-5225)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	6.0
RESISTANCE	(Ohm)	0.46
INDUCTANCE	(mH)	3.8
BIPOLAR HOLDING TORQUE	(Ncm)	920
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	4500
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	20500
BACK E.M.F.	(V/Krpm)	161
MASS	(Kg)	4
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE		IP43-F
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE







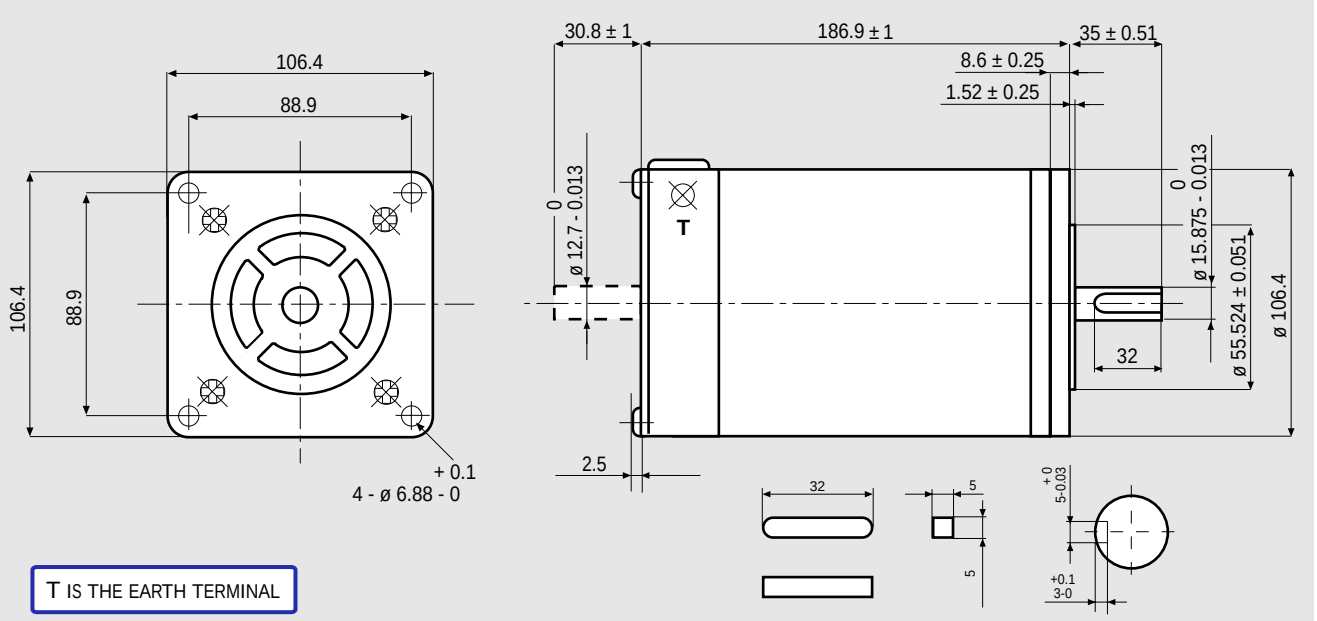
Suggested R.T.A. driver: NDC/A-NDC Series, ADW Series, HGD Series,PLUS Series.

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

103-8932-6451

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

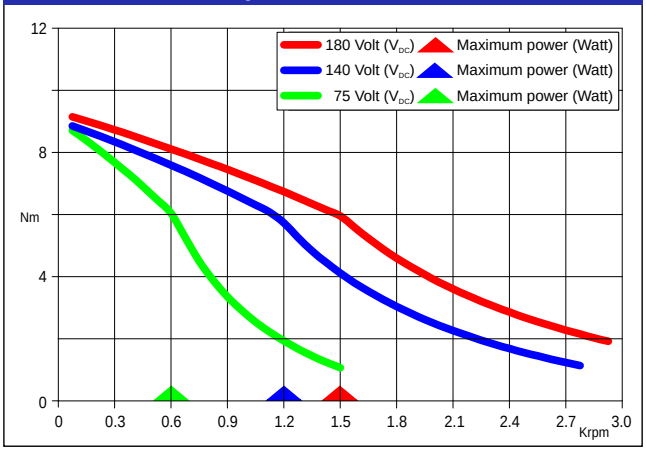


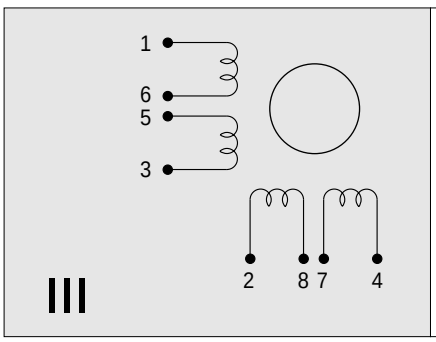
FEATURES

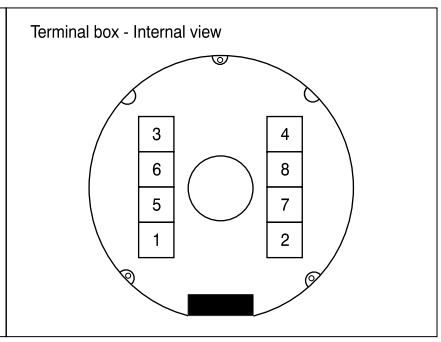
MODEL		103-8932-6451 (103-8932-6421)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	12.7
UNIPOLAR CURRENT	(Amp)	9.0
RESISTANCE	(Ohm)	0.28
INDUCTANCE	(mH)	2.4
BIPOLAR HOLDING TORQUE	(Ncm)	1330
UNIPOLAR HOLDING TORQUE	(Ncm)	1020
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	8000
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	16500
BACK E.M.F.	(V/Krpm)	85
MASS	(Kg)	7.0
PROTECTION DEGREE		IP43
LEADS CODE		III

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE







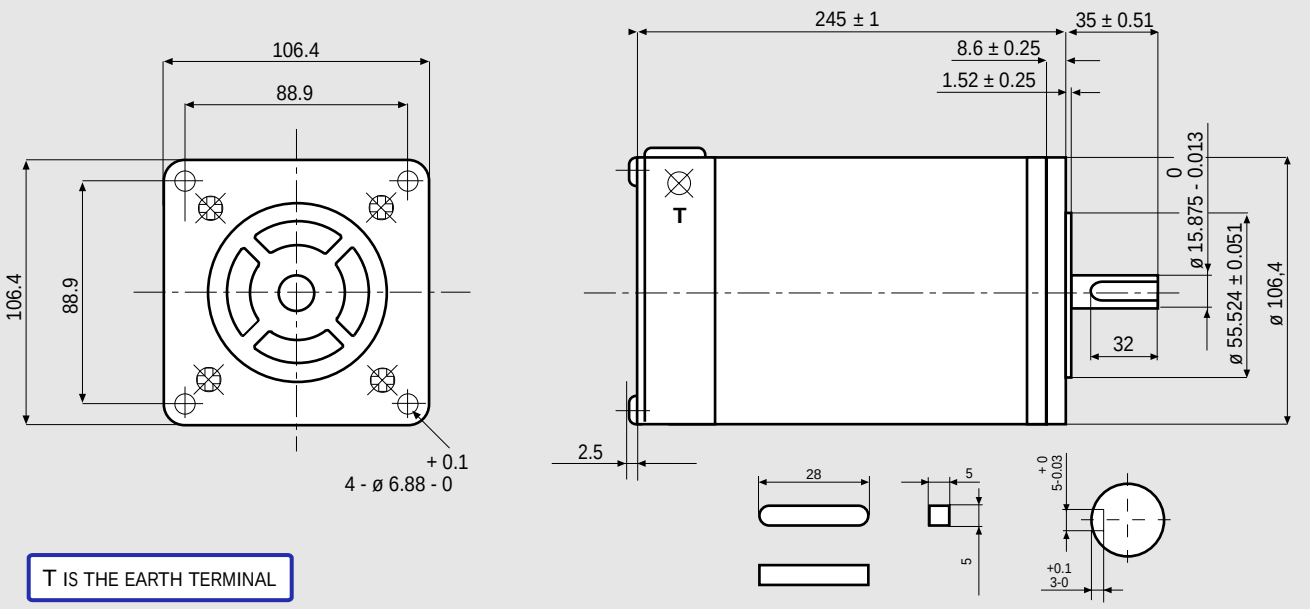
Suggested R.T.A. driver: contact R.T.A.

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

103-8960-6551

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

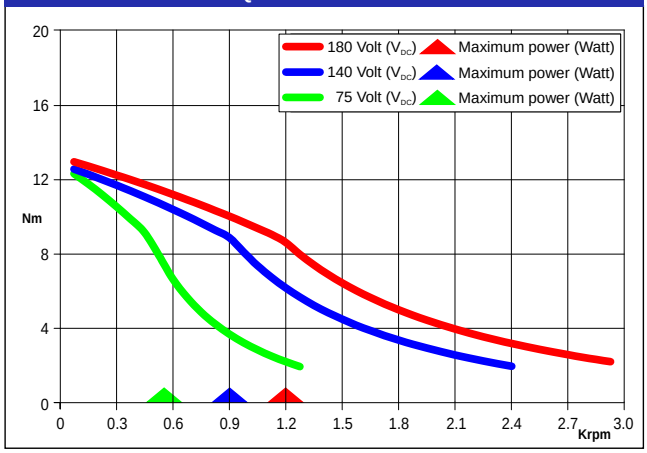


T IS THE EARTH TERMINAL

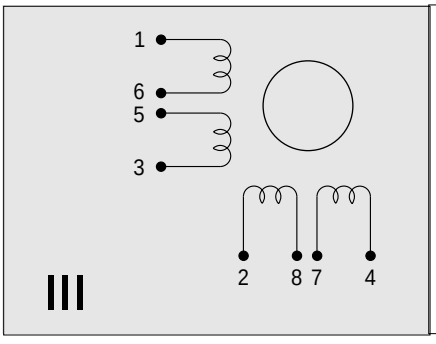
FEATURES

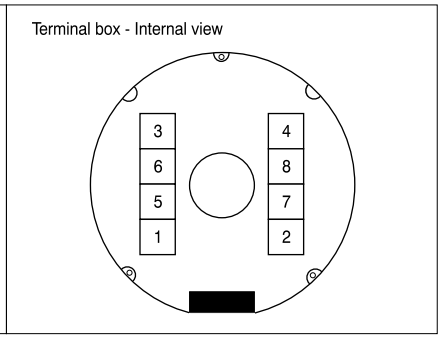
MODEL		103-8960-6551
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	14.1
UNIPOLAR CURRENT	(Amp)	10
RESISTANCE	(Ohm)	0.28
INDUCTANCE	(mH)	3.0
BIPOLAR HOLDING TORQUE	(Ncm)	2060
UNIPOLAR HOLDING TORQUE	(Ncm)	1580
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	11500
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	17900
BACK E.M.F.	(V/Krpm)	120
MASS	(Kg)	10.5
PROTECTION DEGREE		IP43
LEADS CODE		III

TORQUE/SPEED CURVE



R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)



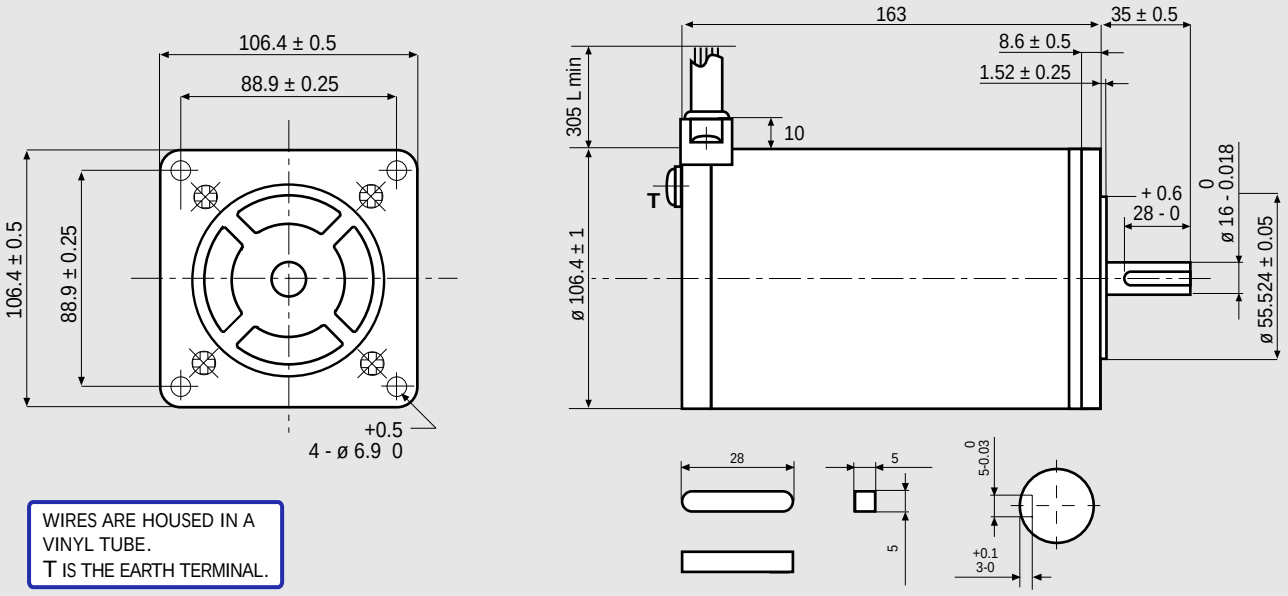


Suggested R.T.A. driver: contact R.T.A.

103-H89222-6341

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)



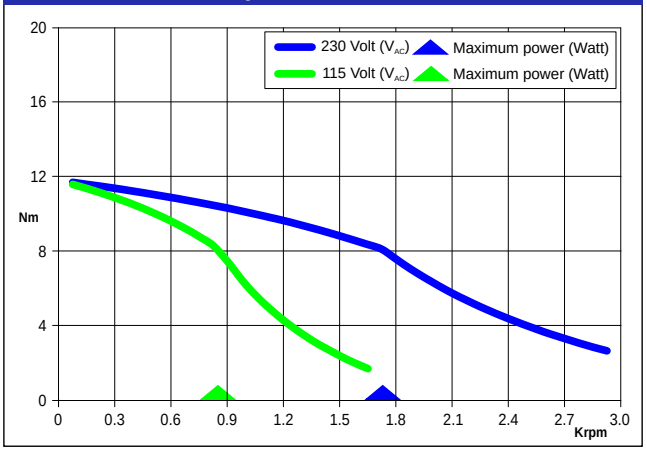
WIRES ARE HOUSED IN A VINYL TUBE.
T IS THE EARTH TERMINAL.

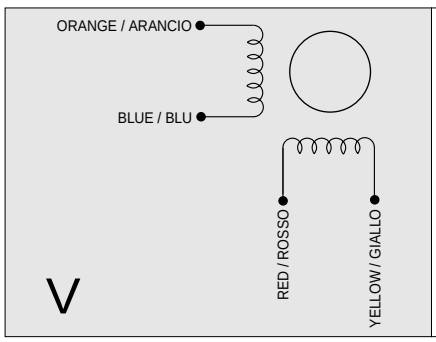
FEATURES

MODEL		103-H89222-6341 (103-H89222-6311)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	6.0
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	0.45
INDUCTANCE	(mH)	5.4
BIPOLAR HOLDING TORQUE	(Ncm)	1620
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	14650
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	11100
BACK E.M.F.	(V/Krpm)	270
MASS	(Kg)	7
PROTECTION DEGREE		IP43
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE



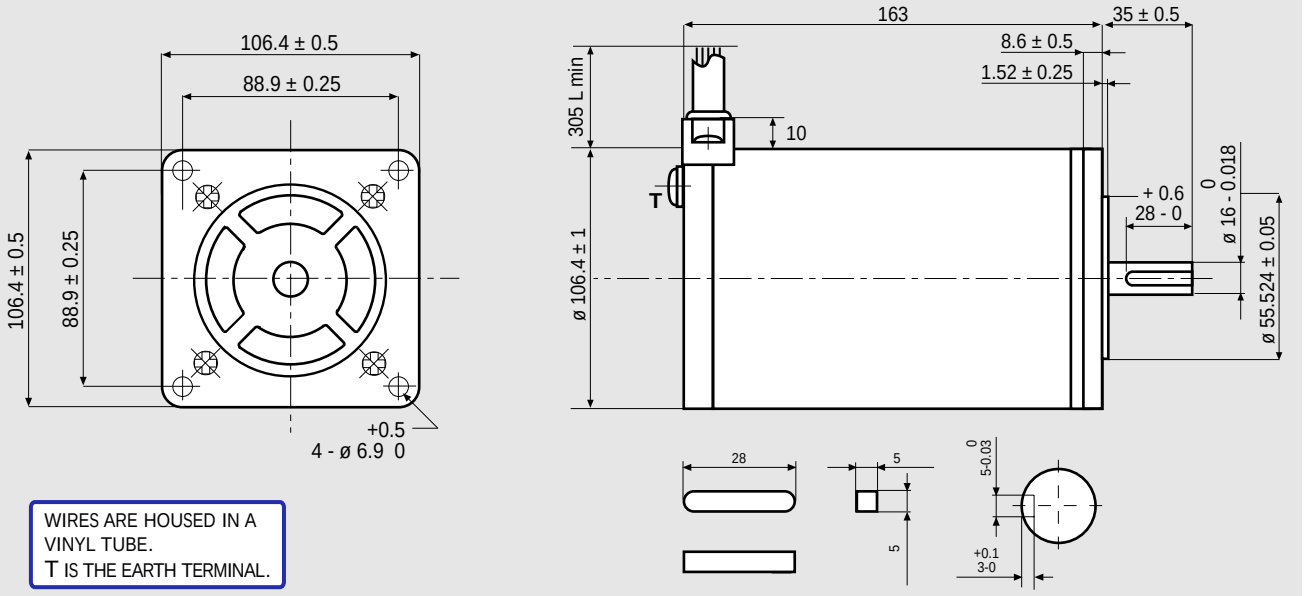


Suggested R.T.A. driver: PLUS Series, X-MIND Series.

103-H89222-6541

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)

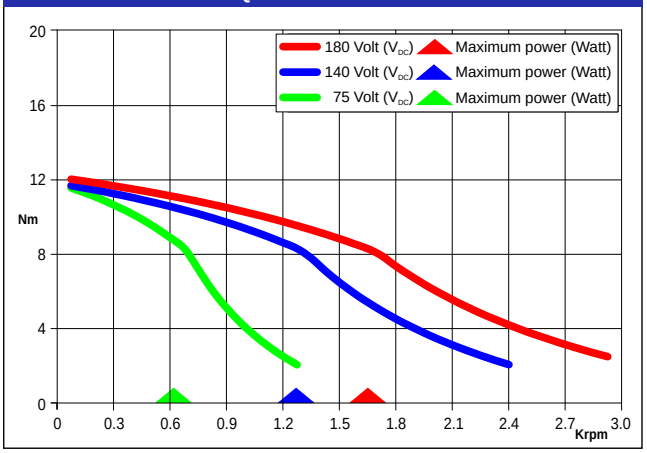


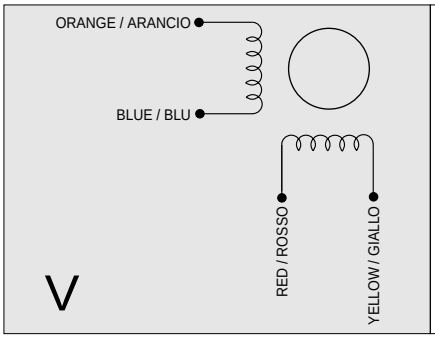
WIRES ARE HOUSED IN A VINYL TUBE.
T IS THE EARTH TERMINAL.

FEATURES

MODEL		103-H89222-6541
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	10
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	0.16
INDUCTANCE	(mH)	1.9
BIPOLAR HOLDING TORQUE	(Ncm)	1620
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	14650
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	11100
BACK E.M.F.	(V/Krpm)	162
MASS	(Kg)	7
PROTECTION DEGREE		IP43
LEADS CODE		V

TORQUE/SPEED CURVE



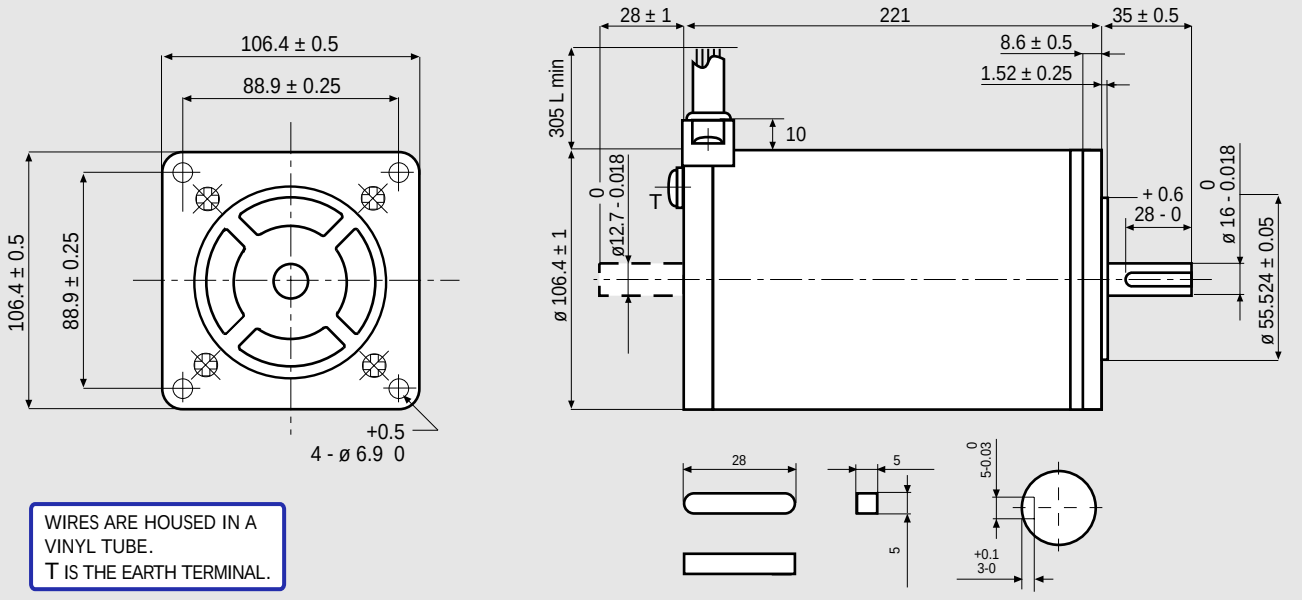


Suggested R.T.A. driver: contact R.T.A.

103-H89223-6341

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)



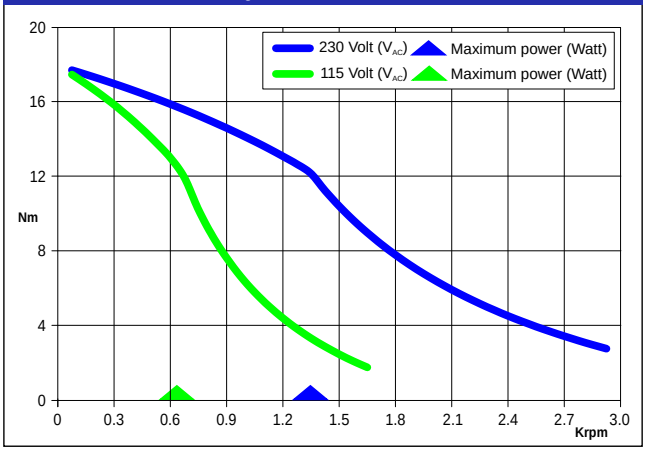
WIRES ARE HOUSED IN A VINYL TUBE.
T IS THE EARTH TERMINAL.

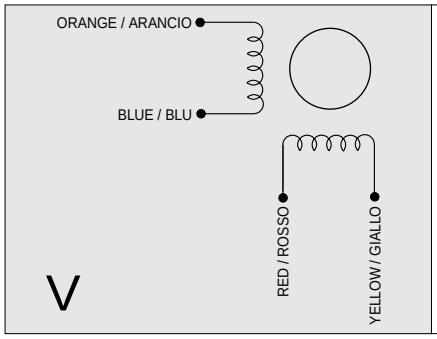
FEATURES

MODEL		103-H89223-6341 (103-H89223-6311)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	6.0
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	0.63
INDUCTANCE	(mH)	8.0
BIPOLAR HOLDING TORQUE	(Ncm)	2460
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	22000
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	11100
BACK E.M.F.	(V/Krpm)	410
MASS	(Kg)	10
PROTECTION DEGREE		IP43
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

TORQUE/SPEED CURVE



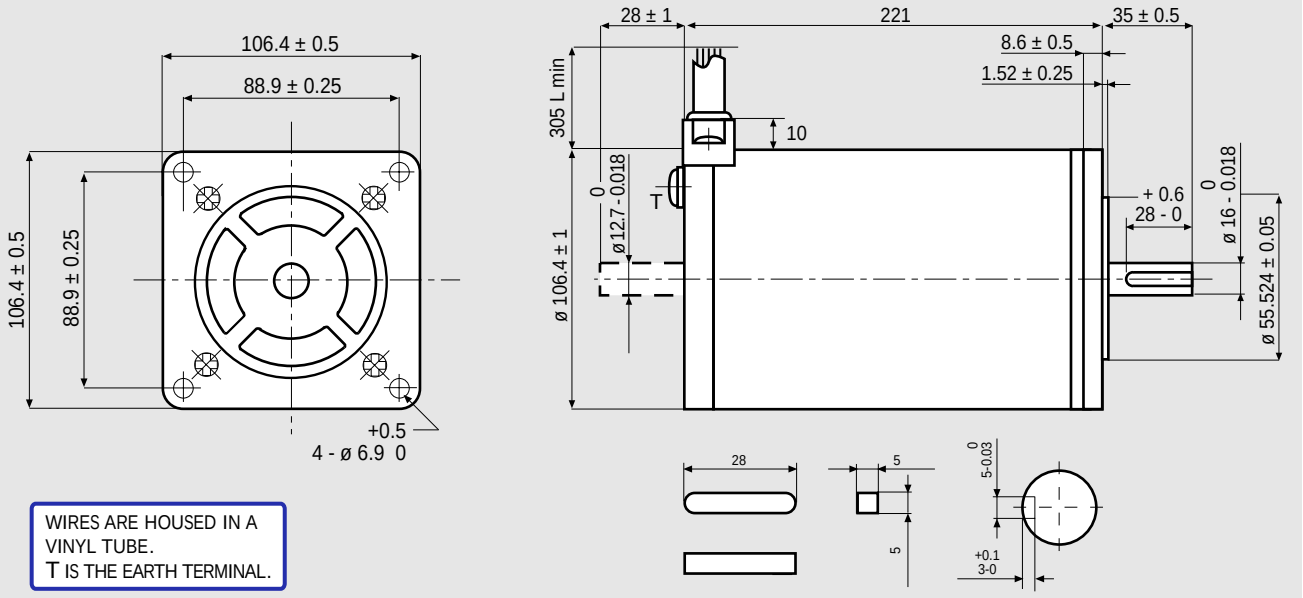


Suggested R.T.A. driver: PLUS Series, X-MIND Series.

103-H89223-6641

SANYO DENKI
SANMOTION

Dimensions (Unit:mm)



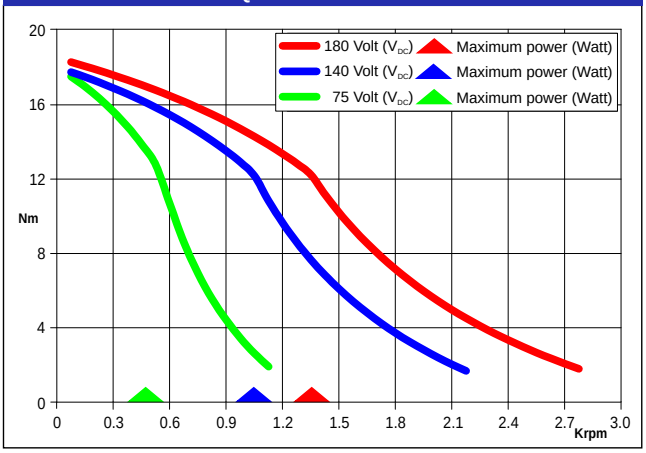
WIRES ARE HOUSED IN A VINYL TUBE.
T IS THE EARTH TERMINAL.

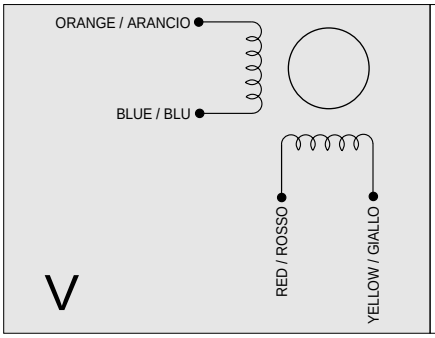
FEATURES

MODEL		103-H89223-6641 (103-H89223-6611)
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR CURRENT	(Amp)	12.0
UNIPOLAR CURRENT	(Amp)	
RESISTANCE	(Ohm)	0.16
INDUCTANCE	(mH)	2.0
BIPOLAR HOLDING TORQUE	(Ncm)	2460
UNIPOLAR HOLDING TORQUE	(Ncm)	
ROTOR INERTIA	(Kgm ^{2} x 10 $^{-7}$)	22000
THEORETICAL ACCELERATION	(rad x sec.$^{-2}$)	11100
BACK E.M.F.	(V/Krpm)	205
MASS	(Kg)	10
PROTECTION DEGREE		IP43
LEADS CODE		V

Codes between brackets refer to double shaft models.
Le sigle fra parentesi si riferiscono ai modelli bialbero.

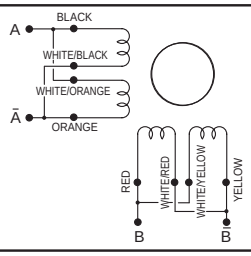
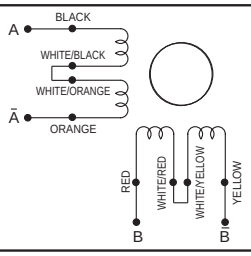
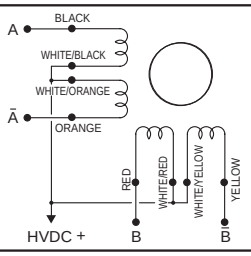
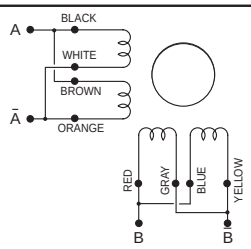
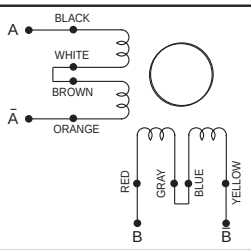
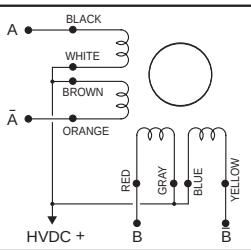
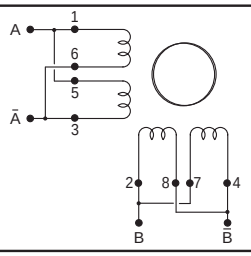
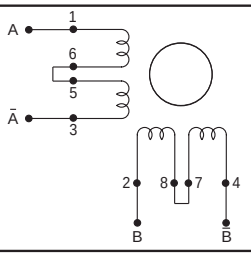
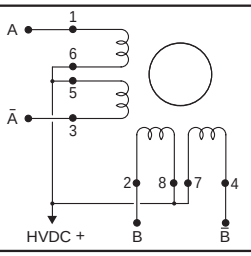
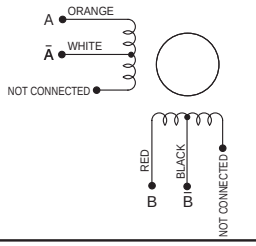
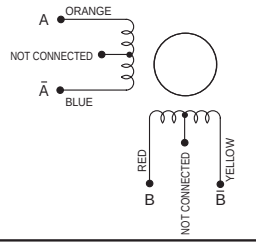
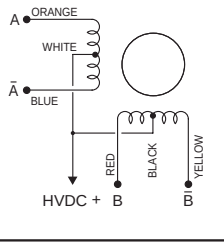
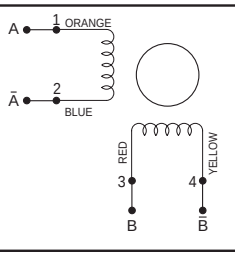
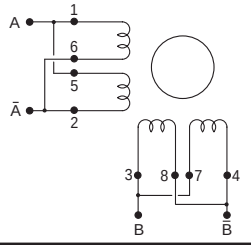
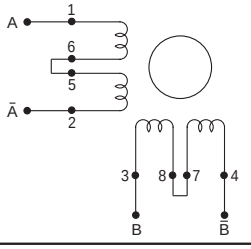
TORQUE/SPEED CURVE





Suggested R.T.A. driver: contact R.T.A.

Connection schematics of R.T.A. drives with SANYO DENKI motors

LEADS CODE *CODICE TERMINALI*	PARALLEL BIPOLAR CONNECTION *COLLEGAMENTO BIPOLARE PARALLELO*	SERIES BIPOLAR CONNECTION *COLLEGAMENTO BIPOLARE SERIE*	UNIPOLAR CONNECTION *COLLEGAMENTO UNIPOLARE*
I			
II			
III			
IV			
V			
VI			

CONVERSION FACTORS

LENGTH	1 mm = 3.937×10^{-2} inch
MASS	1 Kg = 2.205 x lb force
INERTIA	10^7 g cm^2 = 1 Kg m^2 = 5.467×10^4 oz in^2 = 3.417×10^3 lb in^2
TORQUE	1 Nm = 1.416×10^2 oz in = 0.738 ft lb = 8.85 in lb 1 Ncm = 1.416 oz in = 7.38×10^{-3} ft lb = 8.85×10^{-2} in lb
POWER	1 KW = 1.34 hp 1 W = 1.34×10^{-3} hp

Stepping motors with Encoder

STEPPING MOTORS WITH ENCODER
TABLE OF CONTENTS

STEPPING MOTORS WITH ENCODER (EM series motors)	SANYO DENKI MOTOR CODE *CODICE MOTORE SANYO DENKI*	HOLDING TORQUE *COPPIA DI TENUTA* (Ncm.)	FLANGE SIZE *DIMENSIONI FLANGIA* (mm.)	LENGTH *LUNGHEZZA* (mm.)	CURRENT *CORRENTE* (Amp)	TECHNICAL DATA *DATI TECNICI* (page/pagina)
SIZE 1.7" - ☐ 42 mm.						
 EM 1H2H-04D0	103-H5210-4512	51	☐ 42	48.0	2.0	60
SIZE 2.2" - ☐ 56 mm.						
 EM 2H1M-04D0	103-H7123-1711	110	☐ 56	53.8	4.0	61
 EM 2H2M-04D0	103-H7126-1710	165	☐ 56	75.8	4.0	62
SIZE 60 mm. - ☐ 60 mm.						
 EM 6H2M-04D0	103-H7823-1714	300	☐ 60	85.8	4.0	63
SIZE 3.4" - ☐ 85,5 mm.						
 EM 3F1H-04D0	SM 2861-5225	360	☐ 85.5	66.0	6.0	64
 EM 3F2H-04D0	SM 2862-5225	700	☐ 85.5	96.5	6.0	65
 EM 3F3H-04D0	SM 2863-5225	920	☐ 85.5	127.0	6.0	66
 EM 3F1L-04D0	SM 2861-5025	360	☐ 85.5	66.0	2.0	67
 EM 3F2M-04D0	SM 2862-5125	700	☐ 85.5	96.5	4.0	68
 EM 3F3M-14D0	SM 2863-5126	920	☐ 85.5	127.0	4.0	69

SUGGESTED MOTOR WITH ENCODER/DRIVE COUPLING

- The following tables show suggested motor with encoder/drive coupling between SANYO DENKI stepping motors with encoder and R.T.A. Drives.
- R.T.A. suggests contacting its commercial personnel to verify and validate the optimal motor / drive coupling.

- *Nelle tabelle seguenti sono indicati gli accoppiamenti motore con encoder/serie di azionamenti consigliati da R.T.A.*
- *R.T.A. consiglia di contattare il proprio personale commerciale per verificare e validare l'ottimale accoppiamento fra motore e azionamento.*

STEPPING MOTORS WITH ENCODER / DRIVE COUPLING - ENCODER MANAGED BY CONTROL SYSTEM

STEPPING MOTORS WITH ENCODER (EM series motors)	R.T.A. Drives / *Azionamenti R.T.A.**													
	BSD	CSD	CSD J	A-CSD	NDC	A-NDC	ADW	HGD	PLUS A/B	PLUS K	PLUS J	X-PLUS B	X-MIND B	X-MIND K
SIZE 1.7" - ☐ 42 mm.														
EM 1H2H-04D0	■	■		■	■	■	■	■						
SIZE 2.2" - ☐ 56 mm.														
EM 2H1M-04D0		■	■	■	■	■	■	■	■	■	■			
EM 2H2M-04D0		■	■	■	■	■	■	■	■	■	■			
SIZE 60 mm. - ☐ 60 mm.														
EM 6H2M-04D0		■	■	■	■	■	■	■	■	■	■			
SIZE 3.4" - ☐ 85,5 mm.														
EM 3F1H-04D0					■	■	■	■	■	■	■			
EM 3F2H-04D0					■	■	■	■	■	■	■			
EM 3F3H-04D0					■	■	■	■	■	■	■			
EM 3F1L-04D0												■	■	■
EM 3F2M-04D0												■	■	■
EM 3F3M-14D0												■	■	■

STEPPING MOTORS WITH ENCODER / DRIVE COUPLING - ENCODER MANAGED BY R.T.A. DRIVE

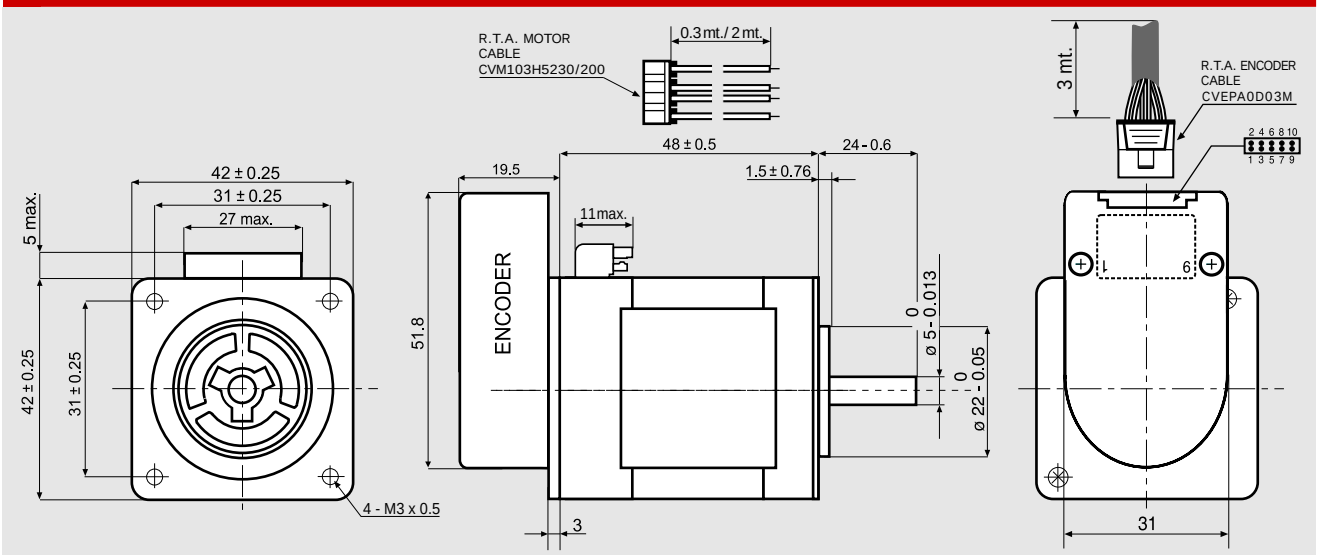
STEPPING MOTORS WITH ENCODER (EM series motors)	R.T.A. Drives / *Azionamenti R.T.A.**			
	Standard signal : DIFFERENTIAL		Standard signal : SINGLE ENDED	
	PLUS ET series	X-PLUS ET series	PLUS E series	PLUS L series
SIZE 2.2" - ☐ 56 mm.				
EM 2H1M-04D0 (04S0)	▬		▬	▬
EM 2H2M-04D0 (04S0)	▬		▬	▬
SIZE 60 mm. - ☐ 60 mm.				
EM 6H2M-04D0 (04S0)	▬		▬	▬
SIZE 3.4" - ☐ 85,5 mm.				
EM 3F1H-04D0 (04S0)	▬		▬	▬
EM 3F2H-04D0 (04S0)	▬		▬	▬
EM 3F3H-04D0 (04S0)	▬		▬	▬
EM 3F1L-04D0		▬		
EM 3F2M-04D0		▬		
EM 3F3M-14D0		▬		

NOTE: Codes between brackets refer to models with SINGLE ENDED standard signal.
NOTA: Le sigle fra parentesi si riferiscono ai modelli con segnale di uscita SINGLE ENDED.

*For more info, please refer to www.rta.it
**Per ulteriori informazioni, si veda www.rta.it*

EM 1H2H-04D0

Dimensions (Unit:mm)

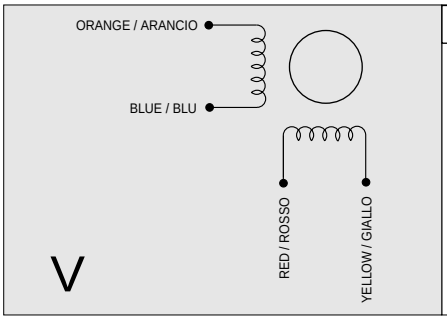


SANYO DENKI MOTOR FEATURES

MODEL		EM 1H2H-04D0
SANYO DENKI MOTOR CODE		103-H5210-4512
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR PARALLEL CURRENT	(Amp)	2.0
RESISTANCE	(Ohm)	1.25
INDUCTANCE	(mH)	2.4
BIPOLAR HOLDING TORQUE	(Ncm)	51
ROTOR INERTIA	($Kgm^2 \times 10^{-7}$)	74
THEORETICAL ACCELERATION	($rad \times sec.^{-2}$)	69000
BACK E.M.F.	(V/Krpm)	14
MASS	(Kg)	0.35
LEADS CODE		V
103-H5210-4512 MOTOR NEEDS CVM103H5230 OR CVM103H52200 R.T.A. CABLES. CONTACT R.T.A. FOR FURTHER DETAILS.		

ENCODER FEATURES

POWER SUPPLY VOLTAGE	(Volt)	5 V_{DC} ± 5%
CURRENT CONSUMPTION	(mAmp)	50
HIGH LEVEL OUTPUT	(Volt)	3.5 (TIP) - 2.4 (MIN) (I_{MAX}=10 mA)
LOW LEVEL OUTPUT	(Volt)	0.2 (TIP) - 0.4 (MAX) (I_{MAX}=10 mA)
OUTPUT SIGNAL		Differential (SINGLE ENDED version available)
RESOLUTION		400 cycles per revolution (500 & 1000 CPR version available)
MAXIMUM FREQUENCY	(KHz)	100
INDEX VERSION		Available upon request
ENCODER NEEDS CVEPA0D03M R.T.A. CABLE. CONTACT R.T.A. FOR FURTHER DETAILS.		



ENCODER PIN-OUTS

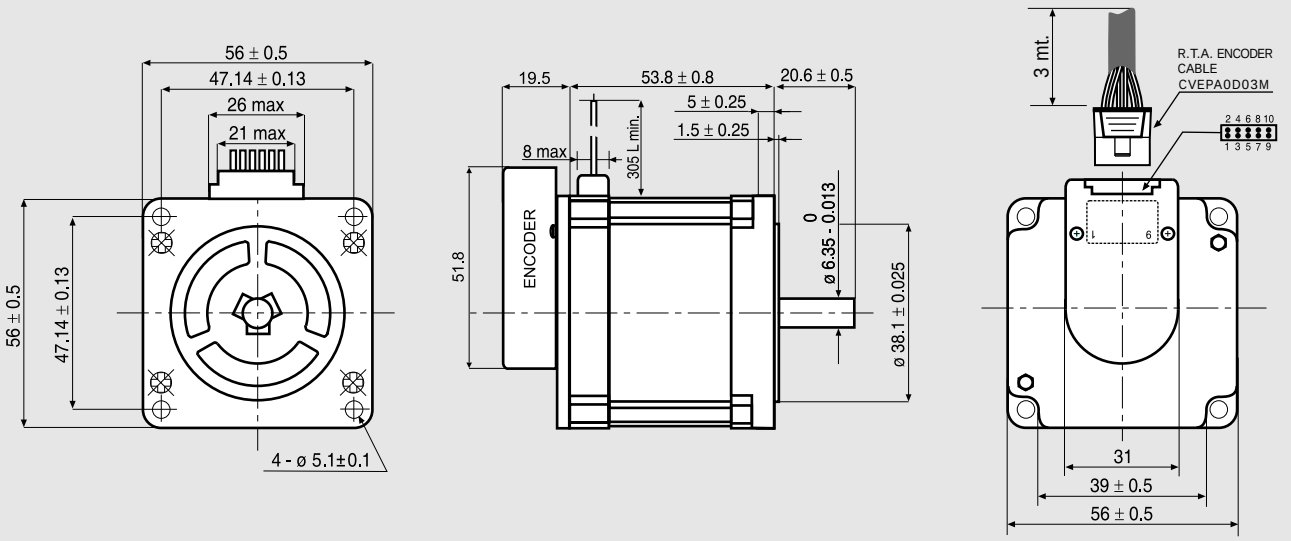
PIN	DESCRIPTION
1	NO CONNECTION
2	+ DC (5 V)
3	GROUND
4	NO CONNECTION
5	CHANNEL A-

PIN	DESCRIPTION
6	CHANNEL A+
7	CHANNEL B-
8	CHANNEL B+
9	NO CONNECTION
10	NO CONNECTION

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

EM 2H1M-04D0

Dimensions (Unit:mm)

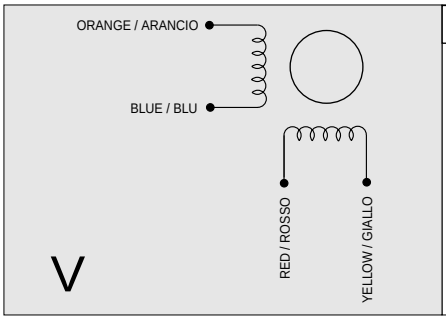


SANYO DENKI MOTOR FEATURES

MODEL		EM 2H1M-04D0
SANYO DENKI MOTOR CODE		103-H7123-1711
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR PARALLEL CURRENT	(Amp)	4.0
RESISTANCE	(Ohm)	0.41
INDUCTANCE	(mH)	1.6
BIPOLAR HOLDING TORQUE	(Ncm)	110
ROTOR INERTIA	($Kgm^2 \times 10^{-7}$)	210
THEORETICAL ACCELERATION	($rad \times sec.^{-2}$)	50000
BACK E.M.F.	(V/Krpm)	20
MASS	(Kg)	0.65
LEADS CODE		V

ENCODER FEATURES

POWER SUPPLY VOLTAGE	(Volt)	5 V_{DC} ± 5%
CURRENT CONSUMPTION	(mAmp)	50
HIGH LEVEL OUTPUT	(Volt)	3.5 (TIP) - 2.4 (MIN) (I_{MAX}=10 mA)
LOW LEVEL OUTPUT	(Volt)	0.2 (TIP) - 0.4 (MAX) (I_{MAX}=10 mA)
OUTPUT SIGNAL		Differential (SINGLE ENDED version available)
RESOLUTION		400 cycles per revolution (500 & 1000 CPR version available)
MAXIMUM FREQUENCY	(KHz)	100
INDEX VERSION		Available upon request
ENCODER NEEDS CVEPA0D03M R.T.A. CABLE. CONTACT R.T.A. FOR FURTHER DETAILS.		



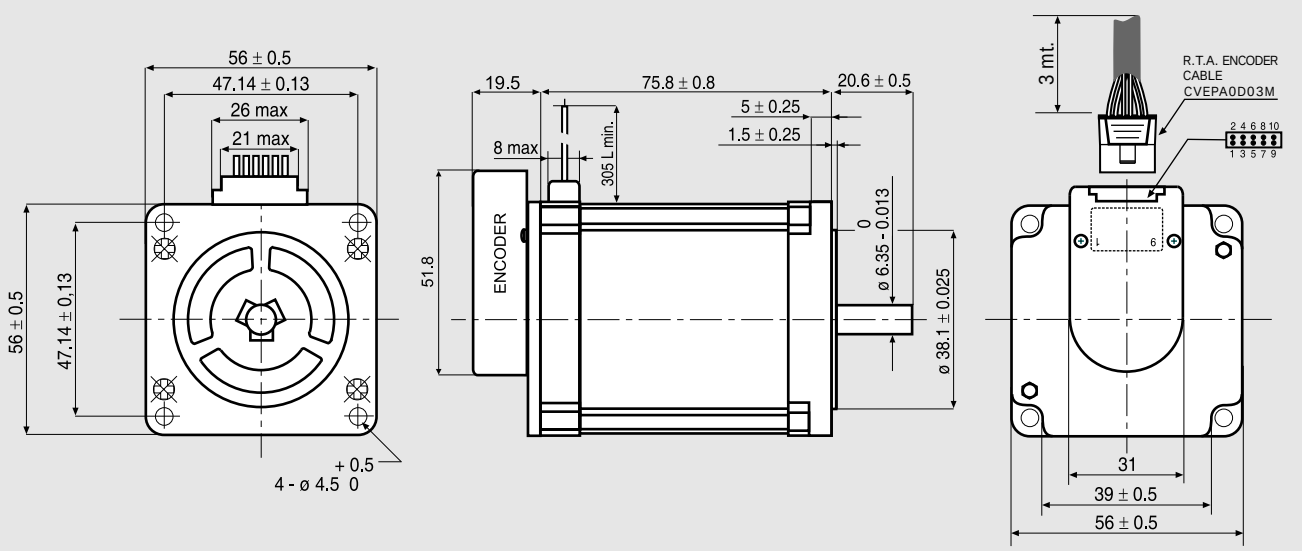
ENCODER PIN-OUTS

PIN	DESCRIPTION
1	NO CONNECTION
2	+ DC (5 V)
3	GROUND
4	NO CONNECTION
5	CHANNEL A-

PIN	DESCRIPTION
6	CHANNEL A+
7	CHANNEL B-
8	CHANNEL B+
9	NO CONNECTION
10	NO CONNECTION

EM 2H2M-04D0

Dimensions (Unit:mm)



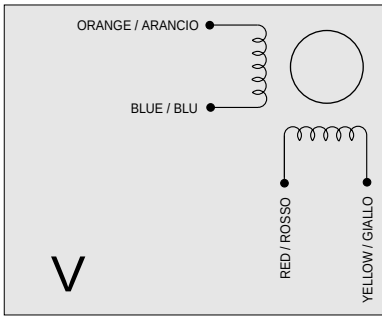
SANYO DENKI MOTOR FEATURES

MODEL		EM 2H2M-04D0
SANYO DENKI MOTOR CODE		103-H7126-1710
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR PARALLEL CURRENT	(Amp)	4.0
RESISTANCE	(Ohm)	0.48
INDUCTANCE	(mH)	2.2
BIPOLAR HOLDING TORQUE	(Ncm)	165
ROTOR INERTIA	($Kgm^2 \times 10^{-7}$)	360
THEORETICAL ACCELERATION	($rad \times sec.^{-2}$)	45800
BACK E.M.F.	(V/Krpm)	31
MASS	(Kg)	1.0
LEADS CODE		V

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

ENCODER FEATURES

POWER SUPPLY VOLTAGE	(Volt)	5 V_{DC} ± 5%
CURRENT CONSUMPTION	(mAmp)	50
HIGH LEVEL OUTPUT	(Volt)	3.5 (TIP) - 2.4 (MIN) (I_{MAX}=10 mA)
LOW LEVEL OUTPUT	(Volt)	0.2 (TIP) - 0.4 (MAX) (I_{MAX}=10 mA)
OUTPUT SIGNAL		Differential (SINGLE ENDED version available)
RESOLUTION		400 cycles per revolution (500 & 1000 CPR version available)
MAXIMUM FREQUENCY	(KHz)	100
INDEX VERSION		Available upon request
ENCODER NEEDS CVEPA0D03M R.T.A. CABLE. CONTACT R.T.A. FOR FURTHER DETAILS.		



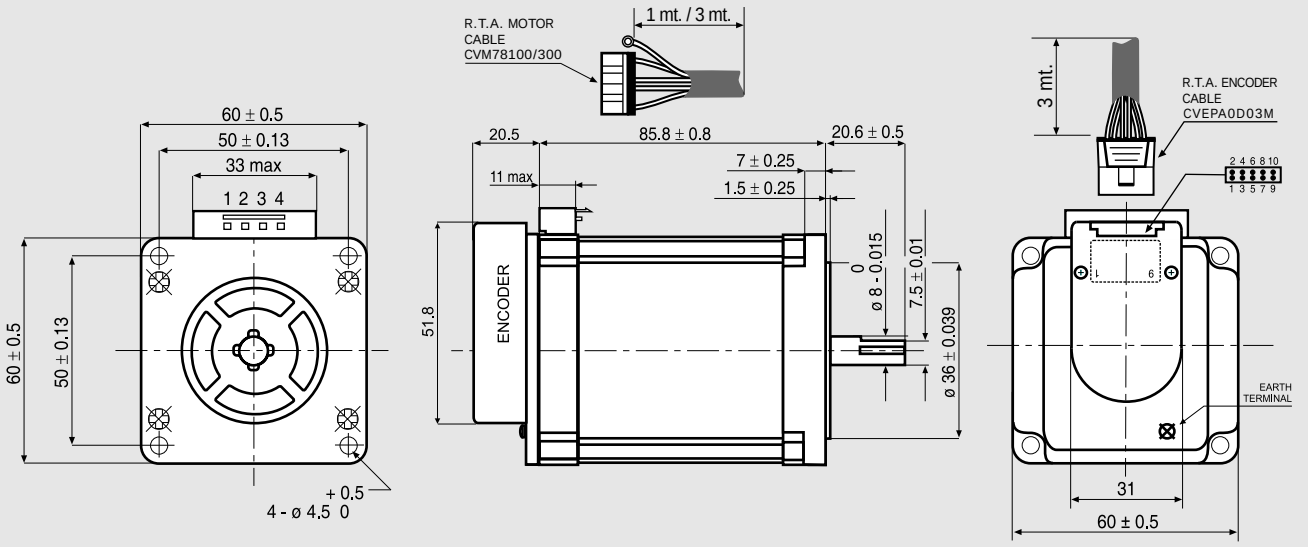
ENCODER PIN-OUTS

PIN	DESCRIPTION
1	NO CONNECTION
2	+ DC (5 V)
3	GROUND
4	NO CONNECTION
5	CHANNEL A-

PIN	DESCRIPTION
6	CHANNEL A+
7	CHANNEL B-
8	CHANNEL B+
9	NO CONNECTION
10	NO CONNECTION

EM 6H2M-04D0

Dimensions (Unit:mm)

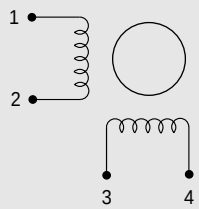


SANYO DENKI MOTOR FEATURES

MODEL		EM 6H2M-04D0
SANYO DENKI MOTOR CODE		103-H7823-1714
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR PARALLEL CURRENT	(Amp)	4.0
RESISTANCE	(Ohm)	0.65
INDUCTANCE	(mH)	2.4
BIPOLAR HOLDING TORQUE	(Ncm)	300
ROTOR INERTIA	($Kgm^2 \times 10^{-7}$)	840
THEORETICAL ACCELERATION	($rad \times sec.^{-2}$)	35700
BACK E.M.F.	(V/Krpm)	75
MASS	(Kg)	1.4
LEADS CODE		V
103-H7823-1714 MOTOR NEEDS CVM78/100 OR CVM78/300 R.T.A. CABLES. CONTACT R.T.A. FOR FURTHER DETAILS.		

ENCODER FEATURES

POWER SUPPLY VOLTAGE	(Volt)	5 V_{DC} ± 5%
CURRENT CONSUMPTION	(mAmp)	50
HIGH LEVEL OUTPUT	(Volt)	3.5 (TIP) - 2.4 (MIN) (I_{MAX}=10 mA)
LOW LEVEL OUTPUT	(Volt)	0.2 (TIP) - 0.4 (MAX) (I_{MAX}=10 mA)
OUTPUT SIGNAL		Differential (SINGLE ENDED version available)
RESOLUTION		400 cycles per revolution (500 & 1000 CPR version available)
MAXIMUM FREQUENCY	(KHz)	100
INDEX VERSION		Available upon request
ENCODER NEEDS CVEPA0D03M R.T.A. CABLE. CONTACT R.T.A. FOR FURTHER DETAILS.		



V

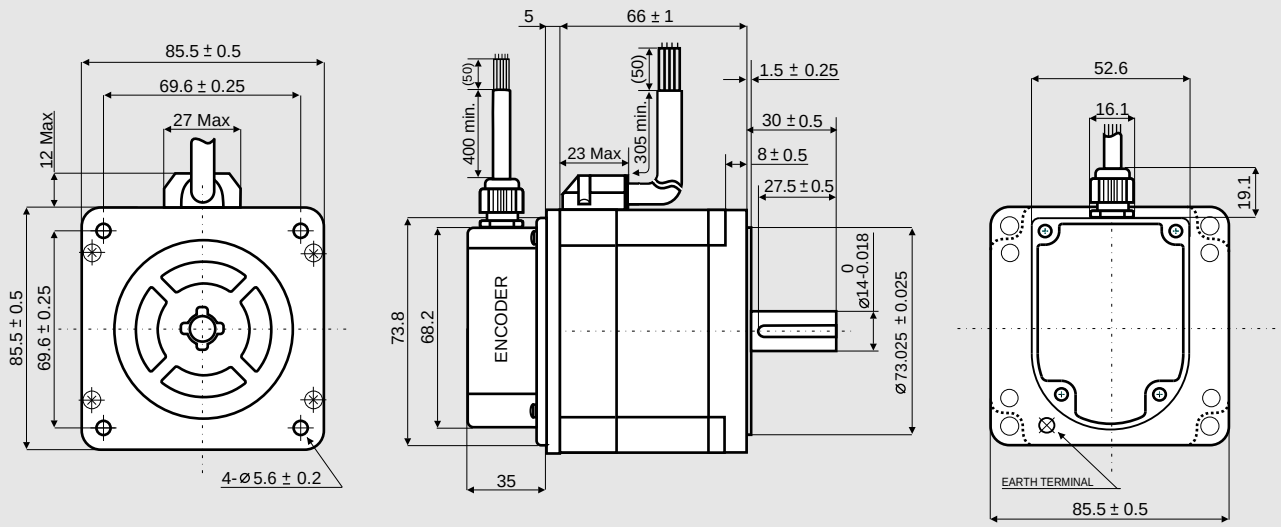
ENCODER PIN-OUTS

PIN	DESCRIPTION
1	NO CONNECTION
2	+ DC (5 V)
3	GROUND
4	NO CONNECTION
5	CHANNEL A-

PIN	DESCRIPTION
6	CHANNEL A+
7	CHANNEL B-
8	CHANNEL B+
9	NO CONNECTION
10	NO CONNECTION

EM 3F1H-04D0

Dimensions (Unit:mm)

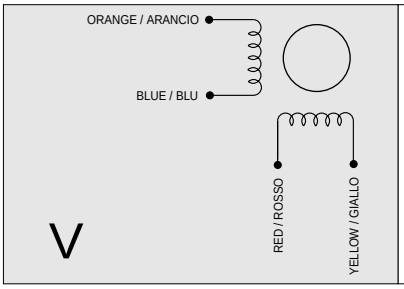


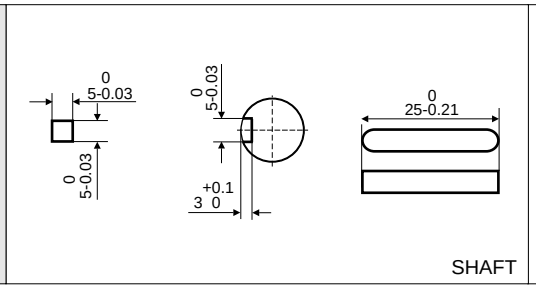
SANYO DENKI MOTOR FEATURES

MODEL		EM 3F1H-04D0
SANYO DENKI MOTOR CODE		SM 2861-5225
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR PARALLEL CURRENT	(Amp)	6.0
RESISTANCE	(Ohm)	0.29
INDUCTANCE	(mH)	1.7
BIPOLAR HOLDING TORQUE	(Ncm)	360
ROTOR INERTIA	($Kgm^2 \times 10^{-7}$)	1480
THEORETICAL ACCELERATION	($rad \times sec.^{-2}$)	24300
BACK E.M.F.	(V/Krpm)	60
MASS	(Kg)	1.7
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE - INSULATION CLASS		IP43 - F
LEADS CODE		V

ENCODER FEATURES

POWER SUPPLY VOLTAGE	(Volt)	5 V_{DC} ± 5%
CURRENT CONSUMPTION	(mAmp)	40
HIGH LEVEL OUTPUT	(Volt)	3.4 (TIP) - 2.4 (MIN) (I_{MAX}=20 mA)
LOW LEVEL OUTPUT	(Volt)	0.2 (TIP) - 0.4 (MAX) (I_{MAX}=20 mA)
OUTPUT SIGNAL		Differential (SINGLE ENDED version available)
RESOLUTION		400 cycles per revolution (500 & 1000 CPR version available)
MAXIMUM FREQUENCY	(KHz)	60
INDEX VERSION		Available upon request



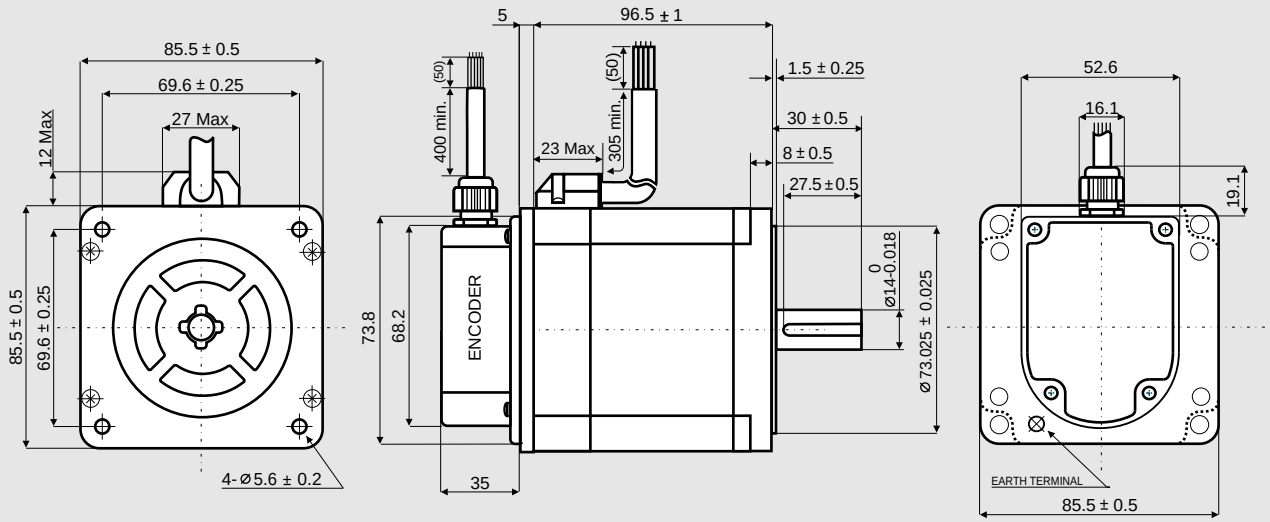


LEADS COLOR	ENCODER
BROWN	CHANNEL A-
BLUE	CHANNEL A+
PURPLE	CHANNEL B-
GREEN	CHANNEL B+
BLACK	GND (0 V)
RED	+ DC (5 V)
SHIELD	

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

EM 3F2H-04D0

Dimensions (Unit:mm)

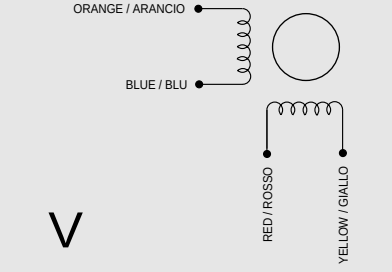


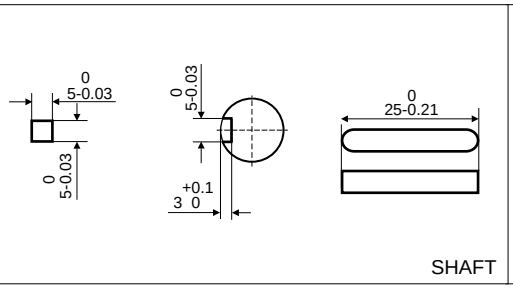
SANYO DENKI MOTOR FEATURES

MODEL		EM 3F2H-04D0
SANYO DENKI MOTOR CODE		SM 2862-5225
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR PARALLEL CURRENT	(Amp)	6.0
RESISTANCE	(Ohm)	0.36
INDUCTANCE	(mH)	2.8
BIPOLAR HOLDING TORQUE	(Ncm)	700
ROTOR INERTIA	($Kgm^2 \times 10^{-7}$)	3000
THEORETICAL ACCELERATION	($rad \times sec.^{-2}$)	23300
BACK E.M.F.	(V/Krpm)	120
MASS	(Kg)	2.9
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE - INSULATION CLASS		IP43 - F
LEADS CODE		V

ENCODER FEATURES

POWER SUPPLY VOLTAGE	(Volt)	5 V_{DC} ± 5%
CURRENT CONSUMPTION	(mAmp)	40
HIGH LEVEL OUTPUT	(Volt)	3.4 (TIP) - 2.4 (MIN) (I_{MAX}=20 mA)
LOW LEVEL OUTPUT	(Volt)	0.2 (TIP) - 0.4 (MAX) (I_{MAX}=20 mA)
OUTPUT SIGNAL		Differential (SINGLE ENDED version available)
RESOLUTION		400 cycles per revolution (500 & 1000 CPR version available)
MAXIMUM FREQUENCY	(KHz)	60
INDEX VERSION		Available upon request



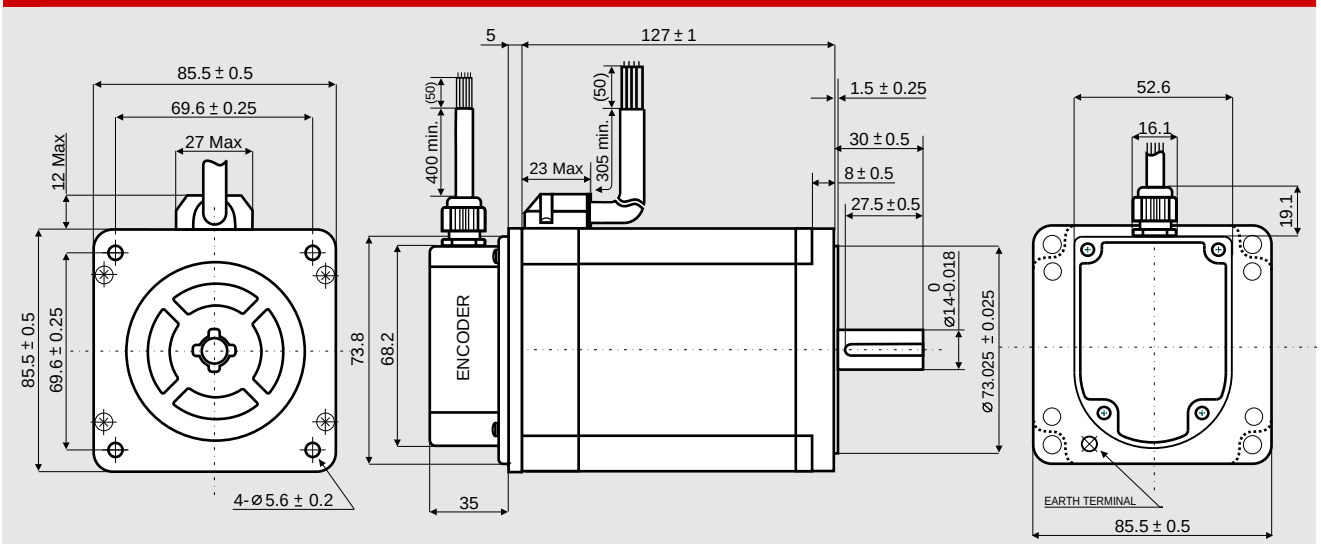


LEADS COLOR	ENCODER
BROWN	CHANNEL A-
BLUE	CHANNEL A+
PURPLE	CHANNEL B-
GREEN	CHANNEL B+
BLACK	GND (0 V)
RED	+ DC (5 V)
SHIELD	

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

EM 3F3H-04D0

Dimensions (Unit:mm)

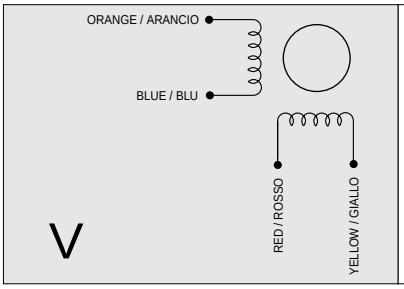


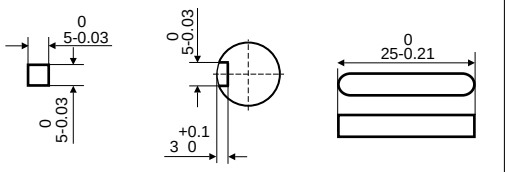
SANYO DENKI MOTOR FEATURES

MODEL		EM 3F3H-04D0
SANYO DENKI MOTOR CODE		SM 2863-5225
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR PARALLEL CURRENT	(Amp)	6.0
RESISTANCE	(Ohm)	0.46
INDUCTANCE	(mH)	3.8
BIPOLAR HOLDING TORQUE	(Ncm)	920
ROTOR INERTIA	($Kgm^2 \times 10^{-7}$)	4500
THEORETICAL ACCELERATION	($rad \times sec.^{-2}$)	20500
BACK E.M.F.	(V/Krpm)	161
MASS	(Kg)	4.0
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE - INSULATION CLASS		IP43 - F
LEADS CODE		V

ENCODER FEATURES

POWER SUPPLY VOLTAGE	(Volt)	5 V_{DC} ± 5%
CURRENT CONSUMPTION	(mAmp)	40
HIGH LEVEL OUTPUT	(Volt)	3.4 (TIP) - 2.4 (MIN) (I_{MAX}=20 mA)
LOW LEVEL OUTPUT	(Volt)	0.2 (TIP) - 0.4 (MAX) (I_{MAX}=20 mA)
OUTPUT SIGNAL		Differential (SINGLE ENDED version available)
RESOLUTION		400 cycles per revolution (500 & 1000 CPR version available)
MAXIMUM FREQUENCY	(KHz)	60
INDEX VERSION		Available upon request



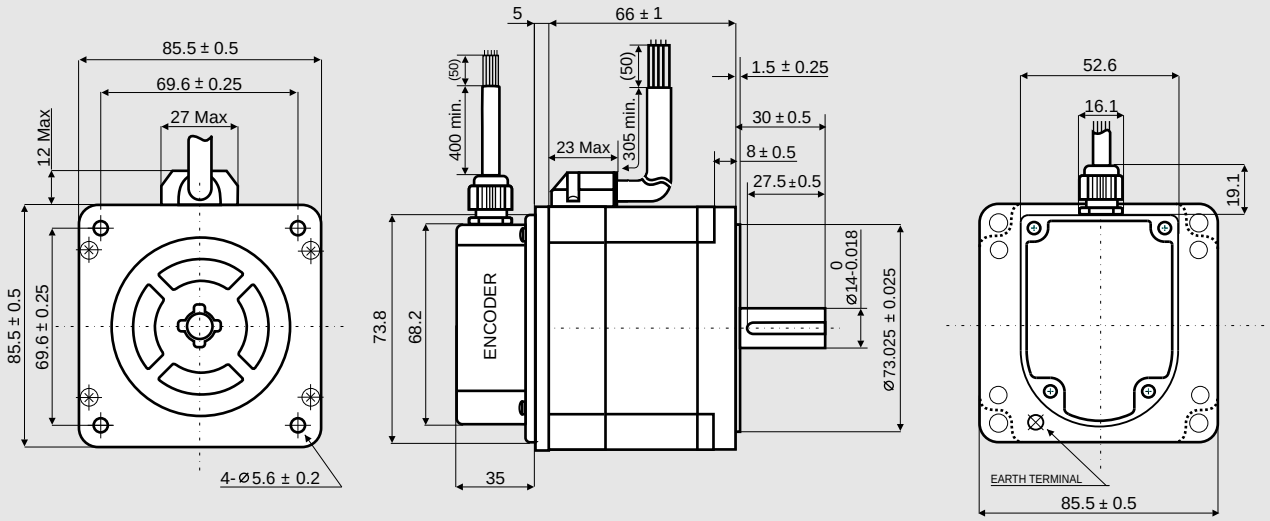


LEADS COLOR	ENCODER
BROWN	CHANNEL A-
BLUE	CHANNEL A+
PURPLE	CHANNEL B-
GREEN	CHANNEL B+
BLACK	GND (0 V)
RED	+ DC (5 V)
SHIELD	

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

EM 3F1L-04D0

Dimensions (Unit:mm)

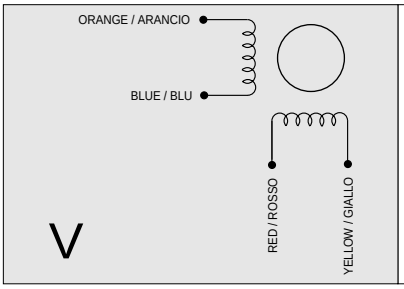


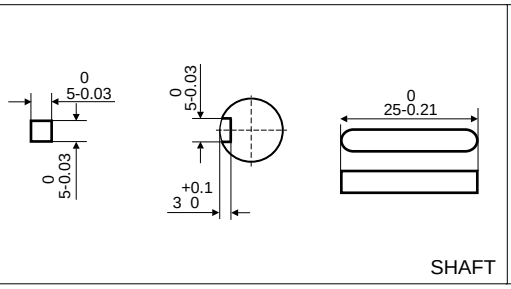
SANYO DENKI MOTOR FEATURES

MODEL		EM 3F1L-04D0
SANYO DENKI MOTOR CODE		SM 2861-5025
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR PARALLEL CURRENT	(Amp)	2.0
RESISTANCE	(Ohm)	2.2
INDUCTANCE	(mH)	15
BIPOLAR HOLDING TORQUE	(Ncm)	360
ROTOR INERTIA	($Kgm^2 \times 10^{-7}$)	1480
THEORETICAL ACCELERATION	($rad \times sec.^{-2}$)	24300
BACK E.M.F.	(V/Krpm)	180
MASS	(Kg)	1.7
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE - INSULATION CLASS		IP43 - F
LEADS CODE		V

ENCODER FEATURES

POWER SUPPLY VOLTAGE	(Volt)	5 V_{DC} ± 5%
CURRENT CONSUMPTION	(mAmp)	40
HIGH LEVEL OUTPUT	(Volt)	3.4 (TIP) - 2.4 (MIN) (I_{MAX}=20 mA)
LOW LEVEL OUTPUT	(Volt)	0.2 (TIP) - 0.4 (MAX) (I_{MAX}=20 mA)
OUTPUT SIGNAL		Differential (SINGLE ENDED version available)
RESOLUTION		400 cycles per revolution (500 & 1000 CPR version available)
MAXIMUM FREQUENCY	(KHz)	60
INDEX VERSION		Available upon request



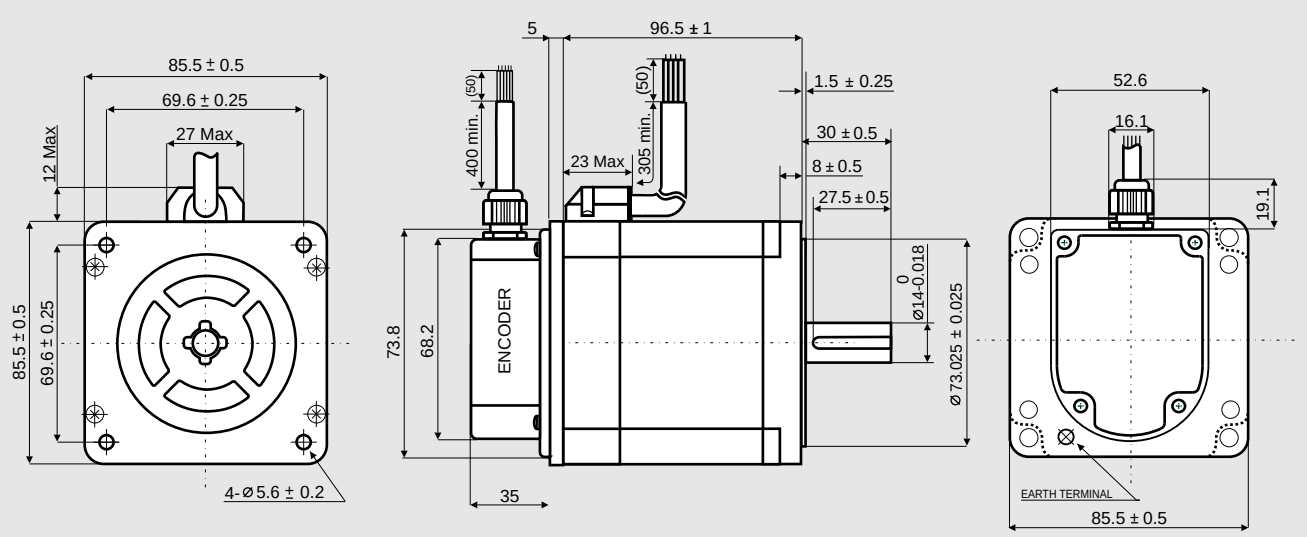


LEADS COLOR	ENCODER
BROWN	CHANNEL A-
BLUE	CHANNEL A+
PURPLE	CHANNEL B-
GREEN	CHANNEL B+
BLACK	GND (0 V)
RED	+ DC (5 V)
SHIELD	

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

EM 3F2M-04D0

Dimensions (Unit:mm)

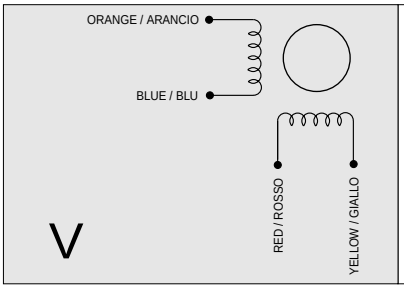


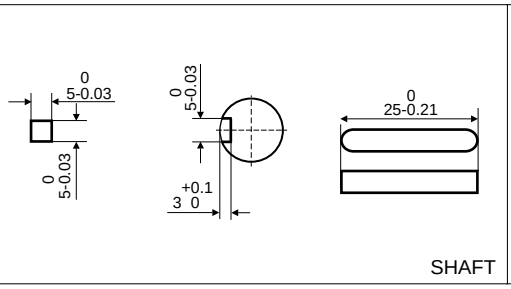
SANYO DENKI MOTOR FEATURES

MODEL		EM 3F2M-04D0
SANYO DENKI MOTOR CODE		SM 2862-5125
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR PARALLEL CURRENT	(Amp)	4.0
RESISTANCE	(Ohm)	0.83
INDUCTANCE	(mH)	6.4
BIPOLAR HOLDING TORQUE	(Ncm)	700
ROTOR INERTIA	($Kgm^2 \times 10^{-7}$)	3000
THEORETICAL ACCELERATION	($rad \times sec.^{-2}$)	23300
BACK E.M.F.	(V/Krpm)	175
MASS	(Kg)	2.9
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE - INSULATION CLASS		IP43 - F
LEADS CODE		V

ENCODER FEATURES

POWER SUPPLY VOLTAGE	(Volt)	5 V_{DC} ± 5%
CURRENT CONSUMPTION	(mAmp)	40
HIGH LEVEL OUTPUT	(Volt)	3.4 (TIP) - 2.4 (MIN) (I_{MAX}=20 mA)
LOW LEVEL OUTPUT	(Volt)	0.2 (TIP) - 0.4 (MAX) (I_{MAX}=20 mA)
OUTPUT SIGNAL		Differential (SINGLE ENDED version available)
RESOLUTION		400 cycles per revolution (500 & 1000 CPR version available)
MAXIMUM FREQUENCY	(KHz)	60
INDEX VERSION		Available upon request

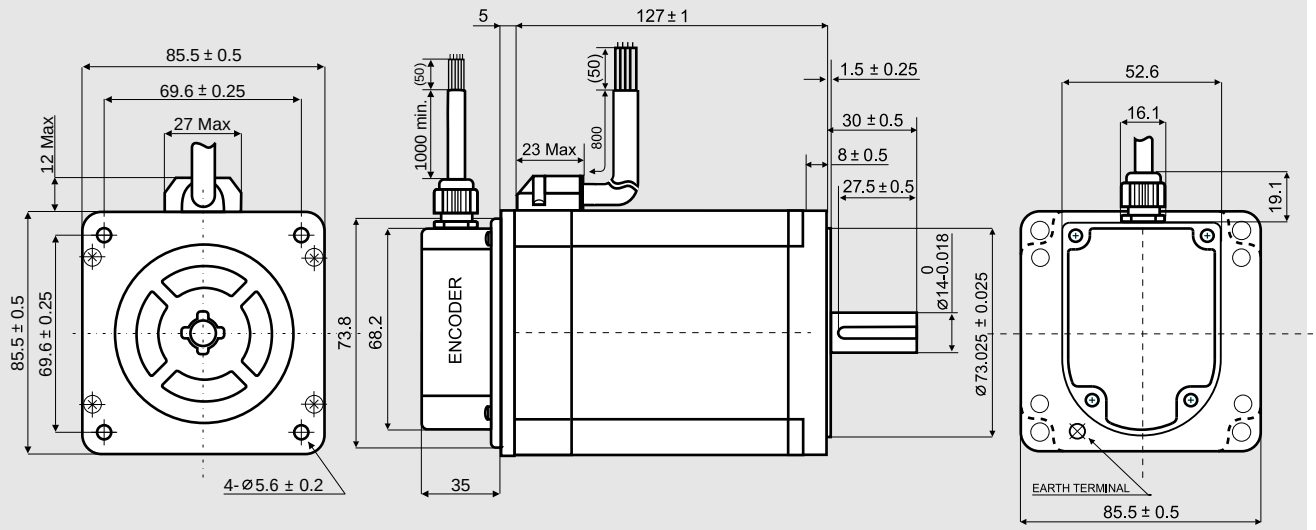




LEADS COLOR	ENCODER
BROWN	CHANNEL A-
BLUE	CHANNEL A+
PURPLE	CHANNEL B-
GREEN	CHANNEL B+
BLACK	GND (0 V)
RED	+ DC (5 V)
SHIELD	

EM 3F3M-14D0

Dimensions (Unit:mm)

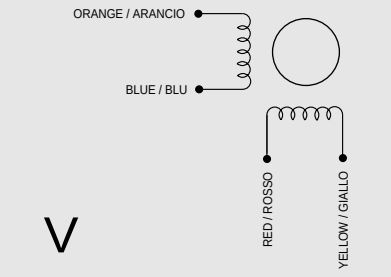


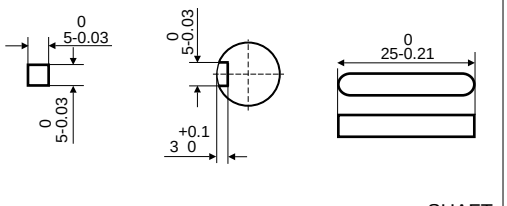
SANYO DENKI MOTOR FEATURES

MODEL		EM 3F3M-14D0
SANYO DENKI MOTOR CODE		SM 2863-5126
BASIC STEP ANGLE		1.8° ± 0.09°
BIPOLAR PARALLEL CURRENT	(Amp)	4.0
RESISTANCE	(Ohm)	1.0
INDUCTANCE	(mH)	7.9
BIPOLAR HOLDING TORQUE	(Ncm)	920
ROTOR INERTIA	($Kgm^2 \times 10^{-7}$)	4500
THEORETICAL ACCELERATION	($rad \times sec.^{-2}$)	20500
BACK E.M.F.	(V/Krpm)	241
MASS	(Kg)	4.0
INTERNATIONAL STANDARDS		UL, CSA
INSULATION VOLTAGE	(V)	250 VAC (350 VDC)
PROTECTION DEGREE - INSULATION CLASS		IP43 - F
LEADS CODE		V

ENCODER FEATURES

POWER SUPPLY VOLTAGE	(Volt)	5 V_{DC} ± 5%
CURRENT CONSUMPTION	(mAmp)	40
HIGH LEVEL OUTPUT	(Volt)	3.4 (TIP) - 2.4 (MIN) (I_{MAX}=20 mA)
LOW LEVEL OUTPUT	(Volt)	0.2 (TIP) - 0.4 (MAX) (I_{MAX}=20 mA)
OUTPUT SIGNAL		Differential (SINGLE ENDED version available)
RESOLUTION		400 cycles per revolution (500 & 1000 CPR version available)
MAXIMUM FREQUENCY	(KHz)	60
INDEX VERSION		Available upon request





LEADS COLOR	ENCODER
BROWN	CHANNEL A-
BLUE	CHANNEL A+
PURPLE	CHANNEL B-
GREEN	CHANNEL B+
BLACK	GND (0 V)
RED	+ DC (5 V)
SHIELD	

R.T.A. s.r.l. PAVIA (ITALY) SANYO DENKI CO.,Ltd (JAPAN)

NOTES

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HEADQUARTERS
R.T.A. s.r.l. - Via E. Mattei
Fraz. Divisa - 27020 MARCIGNAGO (PV)
Tel. +39.0382.929.855 - Fax +39.0382.929.150
www.rta.it - email: info@rta.it

NORTH-EAST BRANCH
Via D. Alighieri, 4/A - 30034 MIRA (VE)
Tel. +39.041.56.00.332 - Fax +39.041.56.00.165
email: rtane@rta.it

CENTER-SOUTH BRANCH
Via D. Alighieri, 41 - 60025 LORETO (AN)
Tel. +39.071.75.00.433 - Fax +39.071.97.77.64
email: rtacs@rta.it

R.T.A. Deutschland GmbH
Bublitzer Straße 34
40599 DÜSSELDORF (Germany)
Tel. +49.211.749.668.60
Fax +49.211.749.668.66
www.rta-deutschland.de
email: info@rta-deutschland.de

R.T.A. IBERICA - Motion Control Systems S.L.
C/ Generalitat 22, 1° 3°
08850 GAVA - BARCELONA (Spain)
Tel. +34.936.388.805
Fax +34.936.334.595
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email: info@rta-iberica.es

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